IMPERIAL BUREAU OF ANIMAL HEALTH

THE

VETERINARY BULLETIN

Vol. 4.] December, 1934. [No. 12.

DISEASES CAUSED BY BACTERIA AND FUNGI.

EDWARDS, S. J. (1934). **Studies on Bovine Mastitis. X.—The Value of Field and Laboratory Tests for the Diagnosis of Chronic Streptococcus Mastitis.** —*J. Comp. Path. & Therap.* **47.** 49-60. 3 tables. [7 refs.] [For abst. of previous articles of this series, see this *Bull.* **4.** 303].

Using as a basis of comparison a rigid cultural method (deep cultivation of the deposit from 10 c.c. of milk from individual quarters in the selective blood agar medium previously described), Edwards has studied the value of certain indirect methods of diagnosis which may be applied in the field, viz., the presence of clots in the fore-milk, of an abnormal reaction and of an excessive deposit after centrifuging. The history of the cow was also considered. 809 cows in 18 herds were examined and of these 295 (36·4 per cent.) were infected with mastitis Group I streptococci (*Str. agalactiae*) in at least one quarter.

Str. agalactiae was almost the only pathogenic organism encountered, and more than three-fourths of these were β-haemolytic. Mastitis streptococci of Group II were met with in 13 cows in seven herds.

Of 528 infected quarters of cows said to be in full milk, 62 per cent. were abnormal to one or other of the indirect tests, but by the same criterion 9·4 per cent. of 2,284 healthy quarters were abnormal. Edwards therefore considers that it is preferable to accept as evidence of infection only instances where both the reaction and the amount of deposit are abnormal or where clots are present in the fore-milk. Using these criteria, 41 per cent. of latent cases of streptococcic mastitis were revealed. In cows in the drying stage, cultural examination is alone of value. Examination of samples of mixed milk from the four quarters of 219 infected cows by plating in deep blood agar showed the presence of streptococci in 91 per cent. The method was liable to fail only where the disease was confined to one quarter, and due either to non-haemolytic streptococci or to haemolytic streptococci present in small numbers. In 83 per cent. of infected quarters the streptococci could be detected by surface cultivation.

Procedures are outlined for the diagnosis of the disease with and without preliminary sorting by means of field tests, but it is emphasized that the full extent of the disease can only be determined by a cultural examination of milk from individual cows.—A. W. STABLEFORTH.

BALTEANU, I., & AGAPI, C. (1933). Etude comparative sur la structure antigénique du Streptocoque gourmeux et du Streptocoque hémolytique scarlatineux. [**Antigenic Structure of the Strangles Streptococcus and the Haemolytic Streptococcus of Scarlet Fever**].—*C. R. Soc. Biol. Paris.* **114.** 754-756. 1 table. [4 refs.]

Extracts prepared from each of four strains of *Str. equi* by treatment with hot N/20 HCl in saline precipitated with an antiserum made with one of them, but did not precipitate with antisera for any of three types of scarlatina streptococci. Conversely, extracts of six strains of scarlatinal streptococci of the three types did not precipitate with the *Str. equi* serum.—A. W. STABLEFORTH.

EDWARDS, P. R. (1934). **The Differentiation of Hemolytic Streptococci of Human and Animal Origin by Group Precipitin Tests.**—*J. Bact.* **27.** 527-534. [12 refs.] [Copied *verbatim* from *Bull. Hyg.* **9.** 556-557. Signed by C. C. OKELL].

The author has already published studies on the haemolytic streptococci of animal origin, showing how they can usually be differentiated from haemolytic streptococci of human origin by their fermentative reactions ; the majority of animal strains fermenting sorbitol but not trehalose, while practically all human strains ferment trehalose but not sorbitol. A special type of animal strain (called type B) has the same reactions as the human strains except that its members have a much enhanced power of reducing methylene blue. Confirmation that type B (animal origin) is different from the human type, has now been obtained by using Lancefield's method of serological precipitation. *Str. equi*, type A (animal) and type B (animal) were found all to belong to the same serological group. No cross agglutination occurred between this group and the group of human haemolytic streptococci.

Biochemical Reactions of Streptococci from Animal and Human Sources.

Source	Number of Cultures	Lactose	Sorbitol	Trehalose	Reduction of methylene blue
Animal –					
Str. equi ...	9	—	—	—	—
Type A ...	159	+	+	—	—
Type B ...	7	±	±	+	+
Human ...	120	±	—	+	114 — 6 +

PLUMMER, Helen. (1934). **The Fermentation of Sorbitol and Trehalose by Haemolytic Streptococci from Various Sources.**—*J. Bact.* **27.** 465-472. [Copied *verbatim* from *Bull. Hyg.* **9.** 557. Signed by W. W. C. TOPLEY].

The author has tested 328 strains of haemolytic streptococci of human origin and 18 strains of animal origin (cattle, guineapig, horse and rabbit) for their ability to hydrolyse sodium hippurate, the degree of acidity produced in dextrose, and the fermentation of certain test substances, especially trehalose and sorbitol.

Only three of the animal strains hydrolysed sodium hippurate – one from the brain of a rabbit that had been inoculated intracerebrally with vaccine virus from

a calf, and two from the milk of cows. Of the 328 human strains, 49 hydrolysed sodium hippurate – two isolated from the throats of milkers associated with an epidemic of sore throat, and 47 from the throats of children in a single institution in which several cases of scarlet fever had occurred.

The human and animal strains that hydrolysed sodium hippurate produced high acidity in dextrose (final pH 4·4 to 4·6). Two additional human strains isolated from the throat behaved in the same way. All other human and animal strains produced a relatively low acidity (final pH 5·0 to 5·2).

All the human strains fermented trehalose but not sorbitol. Of the 18 animal strains, 9 fermented sorbitol but not trehalose, while 9 behaved like the human strains. The 9 sorbitol-fermenting, trehalose-non-fermenting strains behaved like human strains in failure to hydrolyse sodium hippurate and in low acid production. Of the 9 trehalose-fermenting, sorbitol-non-fermenting strains, 3 were typically bovine in their ability to hydrolyse sodium hippurate and in high acid production. The 6 remaining animal strains could not be differentiated from the characteristic human strains by any of the tests applied. Four of these were from samples of milk incriminated in epidemics of sore throat, one was from a rabbit and one from a horse.

HRUSKA, K. (1934). Colibacillosa, colistreptomykosa a streptomykosa selat. [**Coliform and Streptococcal Infection in Suckling Pigs**].—*Zverol. Rozpravy.* **8.** 56-60 and 61-70.

The symptoms of *Bact. coli* infection appear soon after birth (six hours to six days) and are characterized by diarrhoea and eczema. Pathologically three types can be distinguished :– an intestinal form characterized by changes in the digestive tract and parenchymatous organs, a subcutaneous form (oedema) and an eczematous form. The intestinal form is the most prevalent.

Coli-streptococcal infection occurs in six-day-old suckling pigs or in those three to four weeks old. Three types may be distinguished :– the intestinal, eczematous and pectoral forms.

Streptococcal infection appears usually in pigs during the first weeks after birth. Three clinical types of this infection also occur and arthritis is also found.

There are specific treatments for the three types of infection :– prophylactic inoculation of sows with coli-streptococcal vaccine six and four weeks before farrowing; inoculation of suckling pigs soon after birth with coli-streptococcal serum and vaccine.—E. PRIBYL (BRNO).

EMSBO, P., & PLUM, N. (1933). Den laboratoriemassige Miltbrandsdiagnose. [**Laboratory Diagnosis of Anthrax**].—*Maanedsskr. Dyrl.* **45.** 113-137. 1 table, 1 chart.

166 samples, generally the spleen, of animals suspected of anthrax were examined microscopically, by cultivation, by inoculation into mice and by Ascoli's precipitin method. The Giemsa method was superior to all other staining methods and culture yielded better results than inoculation into mice.

The Ascoli method did not yield satisfactory results. This was especially the case with the examination of salted hides. It is still not certain how long the anthrax bacillus lives in diagnostic material (animal tissue) that is kept at 0°C. after arrival at the laboratory. In carcasses of mice kept at about 21°C., living bacilli could be demonstrated until the 117th hour and at a temperature of 5° to 6°C. until the 308th hour. From eight cases of anthrax, 777 mice and 12 guinea pigs were inoculated. There were great differences in the reactions of the test

animals. Whether this was due to differences of strains or to the influence on the bacilli of *post-mortem* changes could not be decided.

—H. Lorenzen (Sonderborg).

I. Hruska, C. (1934). Vaccination glucosidée anticharbonneuse. [**Glucoside Vaccine against Anthrax**].—*Rec. Méd. vét.* **110.** 206-210. 2 figs., 1 table. [2 refs.]

II. Aïtoff, Marguérite. (1934). Inoculation du charbon par la muqueuse conjonctivale. [**Anthrax Infection by the Conjunctiva**].—*C. R. Soc. Biol. Paris.* **115.** 21-22. [2 refs.]

III. Goret, P., Bernad, M., & Camara, A. (1934). Immunisation du Chien contre le charbon bactéridien. [**Immunization of the Dog against Anthrax**].—*Ibid.* 621-622. [2 refs.]

I. The author reports on the results obtained in the vaccination of bovines against anthrax. When using Pasteur's method and various modifications, 1,287 out of 413,815 animals succumbed to the disease, whereas with a glucoside vaccine only 15 out of 34,643 died: The glucoside vaccine was prepared from a culture of pathogenicity corresponding to Pasteur's second vaccine and emulsified in distilled water containing 0·2 per cent. digitonin and 0·3 per cent. saponin.

II. It is shown that guinea pigs are resistant to anthrax infection by the conjunctival route even when the surface has been cauterized, and that the bacilli actually disappear in a short period after instilling the culture. Immediately, however, the surface is penetrated by a sterile needle, the animals die from a generalized infection.

III. The introduction of anthrax vaccine into dogs intramuscularly failed to protect them against a virulent culture, but the intradermal and intratesticular routes proved to be of considerable value in conferring immunity.

—S. J. Edwards.

Svendsen, A. (1934). Om Tuberkulosebekampens nuvaerende Stilling. [**On the Present Position of Tuberculosis Control**].—*Med. dansk Dyrl.* **17.** 157-166 and 185-200. [1 ref.]

The author refers to some new investigations concerning bovine tuberculosis in relation to human infection and *vice versa*, and discusses the need of public education in districts where the control campaign in cattle hitherto has been at a standstill and also various economic details that may assist in this respect (centres for rearing cattle free from tuberculosis, etc.). He suggests a more comprehensive clinical and bacteriological examination of infected herds.

—H. C. Bendixen (Copenhagen).

Voracek, F. (1934). Tlumení tuberkulosy v československé republice a jeho prohloubení. [**Control of Tuberculosis in the Czechoslovakian Republic**].—*Zverol. Rozpravy.* **8.** 13-24 and 25-31. [24 refs.]

Bovine tuberculosis is increasing in Czechoslovakia and in some herds there is an incidence of over 20 per cent. of reactors (as found by tuberculin testing). This is due to the lack of legislation for its control. The author advocates eradication.—E. Pribyl (Brno).

I. Spartz, L. (1934). Les voies de pénétration du virus tuberculeux chez le Veau. [**Pathogenesis of Tuberculosis in the Calf**].—*Bull. Acad. vét. France.* **7.** 205-208.

II. Spartz, L. (1934). L'importance des voies respiratoires dans la genèse de la tuberculose du Veau. [**Respiratory Infection in Tuberculosis in Calves**]. —*Ibid.* 209-212. [1 ref.]

I. In calves examined at the Luxemburg abattoir a larger percentage of tuberculosis was found in calves aged from two to three months than in those between the ages of four to eight weeks. In the older animals more time had elapsed since infection, hence the lesions were easily visible macroscopically. Macroscopic tubercles with caseating centres found in the calf's spleen constitute evidence of pre-natal infection, and their presence in the spleen of a calf a few weeks old indicates, in the author's opinion, an infection from the mother during the last two months of gestation.

II. The high percentage of calves at the Luxemburg abattoir, which the author found affected with pulmonary tuberculosis, and the comparatively low percentage affected in the digestive tract, lead him to conclude that, apart from congenital tuberculosis, the respiratory passages play a most important part in the genesis of tuberculosis in calves.—D. J. Anthony.

I. Menck, F. (1933). Zur Technik der milchserologischen Feststellung der Eutertuberkulose. [**Milk-Serological Diagnosis of Udder Tuberculosis**].—*Deuts. tierärztl. Wschr.* **41.** 726-728. 1 table. [4 refs.]

II. Rautmann, H., & Hartwigk, H. (1934). Der Wert der Milchserum – Komplementbindung für die Feststellung der Rindertuberkulose, insbesondere für den Nachweis der Eutertuberkulose. I. Teil: Milchserologische Prüfungen. [**Value of Complement-Fixation with Milk Serum for the Demonstration of Bovine Tuberculosis, especially Tuberculosis of the Udder**].—*Zschr. Infektkr. Haust.* **45.** 233-249. 2 tables. [4 refs.]

I. Menck discusses the technique of complement-fixation tests with milk serum. He describes his method of obtaining the latter, and draws attention to the fact that milk cannot be used satisfactorily for four to eight weeks before calving and six to 14 days afterwards. Quarter samples are essential. The most important factor is, however, the antigen: successive batches of tuberculin obtained from the same source varied enormously in value, some being quite useless.

II. From a study of over 200 cows which were examined *post mortem*, Rautmann and Hartwigk draw the following conclusions :– complement-fixation by milk serum is a definite indication of the presence of tuberculosis, and in 38 per cent. of cases this proved to be tuberculosis of the udder. A negative result was only associated with tuberculosis of the udder in 3 per cent. of cases, but was often associated with tuberculosis elsewhere in the body. In the diagnosis of udder tuberculosis it may be a valuable auxiliary test, but cannot replace clinical and bacteriological tests, especially guinea pig inoculation.

Udder tuberculosis was never found when both blood serum and whey were negative, was only found in one out of 29 cases where they disagreed, and was found in seven out of 20 cases where they were both positive. Samples of mixed milk are of little or no value.—A. W. Stableforth.

I. Topacio, T. (1933). **Tuberculosis of Swine in the Philippine Islands.**—*Philippine J. Sci.* **52.** 349-367. 3 plates, 6 tables. [23 refs.]

II. Junack, M. (1934). Zum tuberkulösen Primäreffekt und zur Diagnose der Geflügeltuberkulose beim Schwein. [**Avian Tuberculosis in Swine**].—*Zschr. Fleisch- u. Milchhyg.* **44.** 241-243.

III. Pallaske, G. (1934). Zur Frage der anatomischen Diagnose der Geflügeltuberkulose des Schweines. [*Post-mortem* **Diagnosis of Avian Tuberculosis in Swine**].—*Ibid.* 243-246. [2 refs.]

IV. Gminder, A. (1934). Untersuchungen über die Abtötung von Tuberkelbazillen in den Gekröslymphknoten beim Auslassen von Schweineschmalz. [**Experiments on the killing of Tubercle Bacilli in Mesenteric Lymph Glands in the Process of Melting Fat**].—*Ibid.* 404-405. [1 ref.]

V. Bolle, W. (1934). Die Darmtuberkulose des Schweines. Betrachtung vom pathologisch-anatomischen Standpunkt. [**Intestinal Tuberculosis in Swine. Pathological Anatomy**].—*Arch. wiss. prakt. Tierhlk.* **67.** 291-321. 8 figs., 2 tables. [123 refs.]

I. Prior to the institution by the United States Government of a system of meat inspection in the islands, tuberculosis in swine had not been suspected, although the incidence of human tuberculosis was high. It is now established that tuberculosis exists in the Philippines in a high percentage of swine, and that most of it is of human origin. Better disposal of infected human material is advocated, especially in rural areas, and the establishment of an efficient municipal meat inspection service.

II. Avian tuberculosis is frequently found in the carcasses of swine slaughtered in Germany, and the acute form of the disease is by no means rare. A diagnosis by examination of the lymph glands is generally possible without resort to bacteriological methods. The mesenteric lymph glands, and those of the throat are often infected – a macroscopic infiltration of a productive character without tubercle formation. By microscopic examination, the bacilli can be demonstrated in smears from the caseating lymph glands. In apparently negative cases, the Ziehl stain should be warmed gently for 15 to 30 minutes. A glycerine-potato-broth culture medium made from fresh material is recommended, and white mice are stated to be convenient to use for typing.

III. In typical cases of avian tuberculosis in swine the lymph glands show only slight enlargement, and their consistency is somewhat firmer than normal. The cut surface is moist, smooth and of a uniform greyish-white colour and they may be mistaken for non-tuberculous swollen glands. Caseation is sometimes present, and calcification, when it occurs, is usually in the form of minute points. In doubtful cases, a bacteriological examination has to be made.

IV. Portions of caseating and calcifying tuberculous mesenteric lymph glands minced up and mixed with melted pig fat in an open pot over a gas fire for about 1¼ hours at a temperature of between 80° and 120°C., were examined for tubercle bacilli after cooling and filtering. Microscopical examination and guinea pig inoculation of the heated material failed to reveal tubercle bacilli. It is suggested that living tubercle bacilli may be found if the glands are intact or are not cut up into small enough pieces. An offensive smell emanates from the melted glands, and this taints the fat.

V. A review is given of the literature appertaining to intestinal tuberculosis in swine, both by natural and artificial infection. The lesions take the form of minute punctiform nodules in the mucous membrane. The ulcers are small, shallow and not well defined. The histology of the lesions is dealt with and the opinion expressed that tuberculosis of the intestinal tract, if carefully searched for in the course of meat inspection, will be found to be far from rare.

—D. J. Anthony.

Kerl, W. (1934). Ein Fall von Geflügeltuberkulose beim Menschen. [**A Case of Avian Tuberculosis in Man**].—*Wien. tierärztl. Mschr.* **21.** 154.

The demonstration at a meeting of the Gesellschaft der Tierärzte in Wien of a man affected with enlarged lymph glands, obstinate aphthous stomatitis and painless subcutaneous swellings in various parts of the body.

Cultures obtained from the blood and mouth lesions revealed the causal organism to be *Mycobact. tuberculosis*, avian type.—J. E.

FELDMAN, W. H. (1934). **Suitability of Herrold's Egg Yolk Agar Medium for Isolation of the Bovine Tubercle Bacillus.**—*J. Infect. Dis.* **54.** 194-203. 3 tables. [15 refs.]

Herrold's egg yolk agar medium was found unsuitable for the culture of *Mycobact. tuberculosis* from natural infection in cattle, though it is a good medium for the human type of the organism. The author used, as material for his work, 71 lymph glands of cattle which had reacted to tuberculin, the glands being free from visible lesions.—J. E.

VALCARENGHI, E. (1934). L'" esotubercolina Finzi " (E.T.F.) nella diagnosi della tuberculosi canina. [**Esotuberculin Finzi (E.T.F.) in the Diagnosis of Canine Tuberculosis**].—*Profilassi.* **7.** 45-51. [42 refs.] [English and French summaries : abst. from orig.]

The author gives a favourable report on the use of Finzi's esotuberculin for the diagnosis of tuberculosis in dogs by intradermal injection. He asserts that this tuberculin is more reliable for the purpose than " old tuberculin."—J. E.

I. THOMAS, R. M. (1933). **Vaccination with Heat-Killed and Formalinized Tubercle Bacilli in Experimental Tuberculosis.**—*J. Exp. Med.* **58.** 227-235. 2 charts. [6 refs.]

II. SMITHBURN, K. C. (1933). **The Resistance of Rabbits to Tuberculosis after Vaccination with Partially Defatted Tubercle Bacilli.**—*Ibid.* 329-339. 1 table, 5 charts. [15 refs.]

III. ZWICK, ERNST, & DAHMEN. (1933). Zusammenfassendes Gutachten der vom Reichsgesundheitsamt eingesetzten Kommission für die Prüfung der Wirkung des Friedmann-Impfstoffes auf Grund der in der tierärztlichen Literatur niedergelegten Mitteilungen. [**Summarized Results of the Enquiry of the Commission set up by the Reichsgesundheitsamt to test the Action of Friedmann's Vaccine**].—*Reichsgesdhbl.* **8.** 612-614. [Reprinted in *Münch. tierärztl. Wschr.* **84.** 517-518].

IV. PETRAGNANI, G. (1933). Premières recherches sur les propriétés antigéniques du " Phénol bactérien TBC ". [**Antigenic Properties of " Phenol Bacteria TBC."** (*Mycobact. tuberculosis* **Infection**)].—*Boll. Sez. ital. Soc. internaz. Microbiol.* **5.** 261. [1 ref.]

V. BROTZU, G. (1933). La vaccination antituberculeuse par le vaccin formolé. [**Vaccination against** *Mycobact. tuberculosis* **Infection by a Formolized Vaccine**].—*Ibid.* 289-293. 1 table.

I. Rabbits vaccinated with tubercle bacilli killed by exposure to formalin (0·4 per cent.) did not show any acquired resistance to subsequent infection with a virulent bovine strain, while rabbits vaccinated with tubercle bacilli killed by heating to 70°C. for one hour survived more than half as long again as unvaccinated controls.

II. A vaccine prepared from bovine tubercle bacilli, treated with ether and alcohol for the removal of fat, exercised a favourable influence on the survival time of rabbits after the inoculation of virulent culture. The average survival time of rabbits vaccinated intravenously was 31·9 days, whereas that of the controls was 16·7 days.

III. The results of an enquiry into the value of Friedmann's tuberculosis vaccine have shown that further extensive research is necessary before it can be stated that it possesses a prophylactic or curative value.

IV. A preliminary note concerning the preparation of a phenolized vaccine which the author believes to have an inhibitory action on the progress of tuberculosis in guinea pigs.

V. Guinea pigs vaccinated with formolized tubercle bacilli showed a longer survival time, following the injection of living culture, than unvaccinated controls.

—S. J. EDWARDS.

I. KRÖNER, W. (1933). Zur Frage der Apathogenität und Erbbestandigkeit des BCG-Impstoffes (Calmette). [**Apathogenicity and Type Stability of BCG**].—*Münch. tierärztl. Wschr.* **84.** 571-573.

II. VAN RIEMSDIJK, M. (1933). Regressive Eigenschaften des B.C.G. sichtbar im Entwicklungzyklus auf Agar-Agar nach 17monatiger Beobachtung. II. Vorläufige Mitteilung. [**Regressive Properties of BCG on Agar after Seventeen Months**].—*Zlb. Bakt. I.* (*Orig.*). **130.** 247-252. 11 figs. [1 ref.]

III. FAGOT. (1934). La Vaccination par le B.C.G. [**Vaccination by BCG**].—*Echo vét.* **63.** 173-175.

I. Certain factors have been advanced by various authors in opposition to the use of BCG vaccination, whilst other workers have failed to show that they are of importance. Amongst these factors are :– (1) the possibility of the dissociation of BCG *in vitro* into virulent and avirulent forms ; (2) the possible enhancement of the virulence of BCG during animal passage ; (3) the occasional ability of unaltered strains of BCG to kill human beings or animals and (4) the inadequacy of the immunity resulting from BCG vaccination.

II. The colonies and intercolonial connecting links of BCG culture on agar have been studied and compared with those of normal *Mycobact. tuberculosis* [VAN RIEMSDIJK, M. (1933). *Zlb. Bakt. I.* (*Orig.*). **128.** 503]. The author claims to have demonstrated a regression of the mode of growth of BCG, during 17 months of cultivation on agar, towards the type of growth of the normal *M. tuberculosis*.

III. Fagot gives a short general note on BCG and reports that many scores of calves have been inoculated for the last six or seven years. He holds the view that tuberculosis can be eradicated from cattle without the need to change the system of management ordinarily practised.—E. J. PULLINGER.

BRUNZEMA, D., & KAUFFMANN, F. (1933). Weitere Immunisierungsversuche mit der Kultur BCG bei Meerschweinchen, Schafen und Rindern. [**Further Immunization Tests with BCG on Guinea Pigs, Sheep and Cattle**].—*Zschr. Hyg. u. Infektkr.* **115.** 370-389. 7 tables. [11 refs.]

The authors give an account of detailed experiments with BCG on guinea pigs, sheep and cattle. BCG injected subcutaneously into guinea pigs gave a good protection against infection by inhalation, but when BCG was given orally they were susceptible.

Sheep were also premunized to a small extent by BCG, injected subcutaneously, against infection *per os* or by inhalation. Of four lambs given BCG *per os*, only two resisted oral infection. Two out of four calves given BCG subcutaneously resisted infection by inhalation, and four out of six calves given BCG orally resisted oral infection.

The authors conclude that BCG has some slight premunizing value against naturally acquired tuberculosis.—J. E.

I. Calmette, A., Weil-Hallé, B., Saenz, A., & Costil, L. (1933). Démonstration expérimentale du passage des bacilles-vaccins BCG à travers la muqueuse de l'intestine chez l'enfant et chez le singe. [**Absorption of BCG by the Intestinal Mucous Membrane in Children and Monkeys**].—*Bull. Acad. Méd. Paris.* **110.** 203-206.

II. Nègre, L., & Valtis, J. (1934). Sur les propriétés biologiques des bacilles tuberculeux atténués par réensemencements précoces. [**Characters of Strains of *Mycobact. tuberculosis* Attenuated by Rapid Subcultivation**].—*Ann. Inst. Pasteur.* **52.** 488-501. 6 tables. [6 refs.]

I. BCG was recovered by Löwenstein's method from the blood stream of three children out of five who had ingested the vaccine a few hours previously. In a similar manner, the organism was obtained from the blood of two monkeys.

II. Further studies on the attenuation in virulence of strains of *M. tuberculosis*, submitted to repeated subcultivation at short intervals on Sauton's medium, have shown that the phenomenon occurs with greater readiness with old-established strains than with those recently isolated.

The bovine strain Vallée attenuated by 208 such passages was less toxic for the rabbit, lower in lipids and less capable of stimulating antibodies *in vivo* (complement-fixing antibodies) than the unmodified strain : on the other hand, after subcultivation on potato, it was as potent in inducing tuberculin sensitivity in the guinea pig.

The inoculation of laboratory animals with the attenuated strain resulted in a marked arrest in the evolution of the infection produced by the virulent strain.

—R. E. Glover.

Beerens, J. (1933). Contribution à l'étude expérimentale du BCG. [**Experimental Study of BCG**].—*Ann. Inst. Pasteur.* **51.** 466-476. [10 refs.]

An account of a series of experiments on guinea pigs to test the possible pathogenicity of BCG. No exaltation in virulence was observed.—J. E.

Wilkinson, D. E. (1934). **Prophylaxis against the Spread of Johne's Disease.**—*Vet. J.* **90.** 283-285.

The author describes some successful preliminary attempts to arrest losses from *Mycobact. paratuberculosis* infection [Johne's disease] on three farms in England by the application of hygienic measures and the keeping of calves on their own separate pastures, limed and left vacant for some months prior to use.

—J. E.

Lawson, G. B., & Stinnett, M. S. (1933). **Erysipeloid occurring among Workers in a Bone Button Factory.**—*Southern Med. J.* **26.** 1068-1070. [Copied *verbatim* from *Bull. Hyg.* **9.** 307. Signed by E. L. Collis].

A study of 247 cases of erysipeloid which occurred among workers employed in sawing and polishing bones in the manufacture of buttons ; 237 were typical skin infections, 7 affected the eye and 3 the air passages. Infection gained access through an abrasion and became manifest three or four days later ; the inflammation lasted from 14 to 21 days. The area involved became swollen, tender and red, but no general disturbance occurred. Starting usually on a finger the inflammation with well defined edges takes up a large part of the hand ; the swelling seldom goes above the wrist. The bacillus of swine erysipelas has been isolated from a case and from the bones and waste material. No treatment seemed to change the course of the disease.

PACHECO, G. (1933). A posição sistematica das bacterias das febres ondulantes. **[The Systematic Position of the Brucella].**—*Rev. Soc. Paulista Med. vet. Sao Paulo.* **3.** 1-14. 2 tables. [23 refs.] [English summary : abst from orig.]

This paper is principally a discussion of the classification of the brucella group. In the classification adopted by BERGEY, organisms of the brucella group are included in the genus *Alkaligenes*. The author investigated the fermentation reactions of one bovine strain of *Br. abortus*, three porcine strains of *Br. abortus*, and three strains of *Br. melitensis*. All were found to ferment at least two of the 19 carbohydrates employed. He is, therefore, of the opinion that their position in the genus *Alkaligenes* is untenable and he suggests the adoption of the genus *Brucella* and its extension to include *B.* [*Pfeifferella*] *mallei*, changing the present definition of the genus by stating that " some " species require carbon dioxide when recently isolated, and that a few carbohydrates are fermented with acid production. The inclusion of *Pf. mallei* is supported by a discussion of its cultural characters, morphology and pathogenicity.—R. S. ROBERTS.

I. EDELMANN, R. (1934). Die staatliche Bekämpfung des ansteckenden Verkalbens im Lande Sachsen. **[State Campaign against *Br. abortus* Infection in Cattle in Saxony].**—*Deuts. tierärztl. Wschr.* **42.** 311-312.

II. —. (1934). Sachsen. Verordnung des Wirtschaftsministeriums über die Bekämpfung des ansteckenden Verkalbens. **[Saxony. Order on Control of *Br. abortus* Infection in Cattle].**—*Reichsgesdhbl.* **9.** 475-476.

III. —. (1934). Sachsen. Verordnung des Wirtschaftsministeriums über die Bekämpfung des ansteckenden Verkalbens. **[Saxony. Order on Control of *Br. abortus* Infection in Cattle].**—*Ibid.* 631-633.

IV. —. (1934). Sachsen. Durchführung der Bekämpfung des ansteckenden Verkalbens – Blutuntersuchung. **[Saxony. Campaign against *Br. abortus* Infection in Cattle – Blood Examination].**—*Ibid.* 633.

I. This article gives details of ordinances dealing with the control of *Br. abortus* infection in cattle. These include the compulsory segregation of reactors. After a certain date all cattle must be free of infection except those designed for slaughter. Cows showing disease of the sexual organs must not be used for breeding purposes. Persons who attend infected animals must not handle healthy ones.

II. This order includes the usual precautions associated with the control of bovine contagious abortion. The following points are significant :– inoculation of cattle with living *Br. abortus* vaccine is forbidden ; treatment of contagious abortion by non-veterinarians (as a commercial proposition) is forbidden.

III. & IV. These orders emphasize certain points to be borne in mind by veterinarians engaged in the control of contagious abortion. The points concern the testing of 15-month-old cattle and the various procedures to be adopted in the keeping of records. Cattle are identified by means of ear marks. Fifteen-month-old cattle, which fail to pass the agglutination test, must not be sold into clean herds, but may be sold into herds where infection is already present.

—E. J. PULLINGER.

SCHMIDT, W. (1934). Ein Beitrag zum Verlauf und zur Feststellung des Abortus Bang. **[Course and Diagnosis of *Br. abortus* Infection].**—*Arch. wiss. prakt. Tierhlk.* **67.** 250-260. 5 figs., 1 table. [1 ref.]

Detailed observations are given of the course of the infection in two cows, which were artificially infected with *Br. abortus*, the first by the vaginal and the second by the oral route. Whey from each quarter was tested daily, whilst guinea

pig inoculations and cultural tests were made with milk at short intervals and, during one part of the investigation, daily. Blood tests were made weekly.

The first animal became an udder carrier. Both animals showed whey agglutinins within five days, the titre fluctuating around 1 : 10 for some weeks, and running more or less parallel with the blood titre. Definite clinical symptoms appeared in the first animal after six weeks and in the second after ten weeks, and are believed to connote a blood infection, although blood cultures were negative. At this period the blood and whey titres increased rapidly. In the first animal, which became infected in the udder, both remained high, until the closing of the experiment after six months. In the second animal, which produced a normal calf, the titre of both blood and whey gradually dropped after the clinical symptoms disappeared, but remained at a low titre, fluctuating from weakly positive to negative until the end of the experiment seven months after infection. The author emphasizes the fact that large fluctuations occurred in the whey agglutinins from day to day, as well as from quarter to quarter, and that, therefore, a single examination of whey is not a reliable criterion of udder infection.

Brucella were obtained much more frequently by culture (on liver agar) than by guinea pig inoculation ; but frequently one or other, or both, methods failed. A few brucella do not apparently produce infection in the guinea pig.

A brief record is also given of a cow which was infected *via* the teat canal in two quarters in succession. The whey titre of all quarters quickly rose but was most pronounced in the infected quarters.—A. W. Stableforth.

I. Herrmann, O., Chlusszow, K., Lipatow, L., & Dmitriew, A. (1934). Brucellose in Armenien, insbesondere bei Pferden, und Mischinfektion bei letzteren von Brucellose und Paratyphusabortus. [*Br. abortus* **Infection of Horses in Armenia, combined with Abortion due to Paratyphoid Infection**]. —*Berl. tierärztl. Wschr.* **50.** 68-69. [15 refs.]

II. Rossi, P. (1934). La brucellose des équidés. [**Brucella Infection in Horses**]. —*Rev. gén. Méd. vét.* **43.** 65-89. 5 tables. [31 refs.]

I. This work has shown that brucella infection is widely distributed in cattle and horses in Armenia. Other than abortions which occurred in the sixth to the tenth month of the gestation period, the authors observed no particular clinical appearances among horses which had reacted positively to the agglutination test. A positive titre indicating infection was taken as not less than 1 : 100. Mares, stallions and geldings have been found to be infected. In one state 251 horses which had not been housed with cattle were examined. Of these, 45 reacted positively, 102 gave doubtful and 104 gave negative reactions. In Armenia, *Bact. abortus equi* infection is also prevalent in the equine population, and brucellosis may co-exist with it.

II. The author records the results of his work on brucella infection in horses. In horses, the condition is manifested by general phenomena, such as fever and weakness and, more rarely, by local lesions (suppuration, fistulae and rheumatoid swellings) and premature births. The source of the infection is probably cattle, although affected horses were frequently found in domains where no cattle were raised, or where they were healthy. When general symptoms alone prevail, the temperature is raised : it has an undulating character which may persist for weeks. In the unopened suppurative areas, the pus has been found to be odourless, serous, yellow, with fibrinous clots, and rich in brucella organisms, usually in the pure state. The role which *Br. abortus* plays in the causation of fistulous withers is discussed and, in a wide grouping of cases not necessarily related to abortion in cattle, the author found 20 out of 33 cases due to, or associ-

ated with, brucella. After subcutaneous injection of dead bacilli, naturally or experimentally affected animals developed a fever for one or two days with a hot, painful swelling, which tended to rapid abscess formation. It is interesting to note that living brucella were sometimes isolated from the pus. Twenty-five out of 26 animals which were positive serologically gave positive dermal reactions. The intradermal test is considered to be a very sensitive one and manifested itself in spite of variations in agglutinating titres.—D. R. Wilson.

I. Gilman, H. L., Milks, C. H., & Birch, R. R. (1934). **Passage of Bovine Brucella Through Swine.**—*J. Infect. Dis.* **54.** 171-174. 1 table. [2 refs.]

II. McNutt, S. H. (1934). **Brucella Infection of Swine.**—*J. Amer. Vet. Med. Ass.* **84.** 620-627. 6 figs. [13 refs.]

III. Feldman, W. H., & Olson, C., Jr. (1934). **Isolation of Bacteria of the Brucella Group in Cases of Spondylitis of Swine : An Additional Study.**—*Ibid.* 628-634. 2 figs., 1 table. [1 ref.]

IV. Hayes, F. M. (1934). **Brucella Infection in Swine.**—*Ibid.* 322-329. [7 refs.]

I. The authors carried out experiments to determine whether passage of bovine strains of brucella through a series of sows would induce these strains to assume the characteristics of the porcine strain, as judged by the dye tolerance tests. Three bovine strains of brucella were used in the experiments. The sows were inoculated intravenously with the bovine strains and killed after varying periods and the organs and lymphatic glands cultured. Sometimes it was necessary to resort to guinea pig inoculation to recover the organism from the sows. One strain was passed through two sows, two strains were passed through two series of five sows, and one strain passed through six sows.

The passage of the bovine strains through sows did not bring about any change as judged by the dye tolerance tests.

II. McNutt points out that, contrary to general belief, brucella infection of adult swine may be of a serious nature and may occasionally be, directly or indirectly, the cause of death. The author surveys briefly the literature on the distribution of the organism in the systems of " carrier " animals. It may cause pathological changes in the predilected sites and have an adverse effect on the general health. The lymphatic glands of affected pigs become enlarged, softened and oedematous, and show on section a considerable increase in interstitial tissue. Referring to the isolation of brucella from pigs, McNutt points out that an agglutination titre of 1 : 50, and possibly lower, apparently indicates infection.

In three out of ten reacting non-pregnant sows, *Br. abortus* (bovine type) was isolated from the uterus eight months after farrowing ; in two of these animals there was an extensive endometritis with enormous numbers of brucella present. McNutt records three cases of advanced orchitis caused by the bovine type.

III. Feldman and Olson studied 20 cases of spondylitis of swine. In eight instances the lesions were situated in the lumbar vertebrae, twice in the thoracic vertebrae, and in one the lesion involved the second and third sacral vertebrae.

In two of the 20 cases studied, brucella organisms were isolated on culture media and in one case by guinea pig inoculation.

The authors reported in a previous publication the isolation of brucella organisms from ten cases of spondylitis out of 24 examined.

IV. This is a review of some of the principal facts about *Br. abortus* infection, porcine strain. No survey of sufficient magnitude has yet been undertaken to show the percentage of infected herds in the country, nor the average amount of infection in individual herds. In the light of the work carried out, Hayes considers

that about 5 per cent. of pigs are positive to the agglutination test in those states where pig breeding is extensively practised.

He refers to the known pathogenicity for human beings of porcine strains of brucella, undulant fever being contracted either through contact with infected pigs or by the ingestion of milk obtained from the udders of cows harbouring the organism. The majority of cases of undulant fever are, however, of bovine origin and are contracted from the use of raw dairy products or by contact with infected bovines. Given equal opportunity for infection there is little doubt that the number of cases of undulant fever caused by the porcine strain would far outnumber those caused by the bovine strain. The clinical history of a swine herd is no criterion as to the amount of infection present. Although abortion " storms " occasionally occur, the presence of the disease is usually indicated by the premature birth of the litter, or by the appearance of undeveloped dead pigs in an otherwise normal litter and by some lameness and sterility among the sows.

Hayes has had considerable experience with the agglutination test for the detection of pig " carriers " and has found it to be as reliable for the detection of brucella infection as in cattle. A higher percentage of infected pigs may perhaps react in the low dilutions and the number of suspicious cases is relatively larger.

Intradermal diagnostic tests have been tried, but the results obtained were not encouraging.

The porcine strain of *Br. abortus* has been isolated from the following tissues of naturally infected pigs :– submaxillary, prescapular, prefemoral, superficial inguinal, bronchial, gastrohepatic and mesenteric lymphatic glands, spleen, liver, bile, urine and male and female reproductive organs.

The organism was isolated from 2 per cent. of a group of pigs killed when the agglutination titre was not above 1 : 50, and from 75 per cent. of those pigs showing titres of 1 : 100 or higher.

" There is no doubt but that it [infection with the porcine strain of *Br. abortus*] slowly is spreading over this country, even though its spectacular effects may not be so evident as in the disease in cattle and the monetary losses not so great to the swine industry. However, this is counter-balanced certainly by the danger to human beings and by its effect upon the programmes for controlling Bang's disease in cattle that are now in progress."

—T. M. Doyle.

I. Cameron, H. S. (1933). **The Viability of** *Brucella abortus*.—*Rep. New York State Vet. Coll. 1931-1932.* pp. 177-187. 3 tables. [12 refs.]

II. von Wicht, E. (1934). Experimentelle Beiträge zur Biologie des Erregers der Bangschen Krankheit. [**Experimental Contribution on the Biology of Brucella**].—*Zlb. Bakt. I.* (*Orig.*). **131.** 54-70. 10 tables. [68 refs.]

I. Viability was determined by guinea pig inoculation unless cultures could be obtained sufficiently pure to be tested with a brucella antiserum. The strain resisted four and a half hours' direct sunlight ; five days when dried in burlap sacking kept on a laboratory table ; 30 days when dried in burlap sacking kept in an unheated cellar ; 121 days (the maximum interval covered) when dried in the presence of nutrient material ; 72 days when dried in the absence of nutrient material ; less than four days in soil which dried quickly in petri dishes placed in an unheated cellar in October but 27 days (the maximum period covered) during February ; 37 days in soil that dried slowly in test tubes in a laboratory cupboard and 66 days (the maximum interval covered) after having been in wet soil stored in an unheated cellar ; four days in normal bovine urine at room temperature ; 120 days in bovine faeces which were kept in an unheated cellar and did not dry ; 77 days (the maximum interval covered) in the presence of putrefaction ; 77 days in tap water which was sterilized before the organism was introduced and kept at

room temperature and 114 days in tap water kept at a temperature approximating 4°C.

The author notes that under natural conditions the presence of other organisms and their products would probably decrease the viability of the strain, but that infection may well be spread by dust particles since its resistance to drying was marked. Further experiments are to be carried out with a fresh bovine strain and on the action of the common disinfectants.

II. No change in pH was produced by growing *Br. abortus* or *Br. melitensis* (four strains) in a simple broth medium for two to ten days, nor was any significant utilization of glucose observed with either *abortus* or *melitensis* strains.

Brucella are killed *in vitro* within 24 hours by " rivanol " at a concentration of 1 : 40,000 to 1 : 320,000 (average for 25 strains 1 : 83,000) and by " balkanol " at a similar concentration, the action of both being apparently due to the acridine nucleus.—A. W. Stableforth.

I. Dacey, H. Gladys, & Korovin, N. (1934). **Intracutaneous Reactions Induced in Guinea Pigs Inoculated with** *B. abortus*. **A Preliminary Report.**—*J. Lab. & Clin. Med.* **19.** 589-592. [27 refs.]

II. —. (1934). **The Intradermal Reaction in Brucella Infections.**—*Lancet.* **227.** 34-35. [2 refs.]

I. In view of the severe skin reactions which may follow the intradermal injection of " abortins " containing non-specific protein fractions, the authors have prepared a carbohydrate substance by treating *Br. abortus* either with dilute, boiling sodium hydroxide or by repeated freezing and thawing. The carbohydrate was freed from acid-coagulable proteins by means of acetic acid and from heat-coagulable proteins by boiling. The fraction which remained was precipitated by 95 per cent. alcohol. The intracutaneous inoculation of guinea pigs infected with *Br. abortus* induced macular reactions with no evidence of necrosis.

II. In this annotation, the failure to demonstrate agglutinins in the blood in some cases of brucella infection is discussed. It is suggested that the reason may be found either in the use of unsuitable strains or in the severe treatment of suspensions with formalin or other reagents which may render them insensitive. This drawback has led to the employment of the intradermal allergic reaction. The value of this method is discussed with special reference to the work of Arbatskaia and Moroskin on the use of a heated saline suspension of brucella cultures injected intradermally in a dose of 0·1 c.c. This reagent is recommended in order to avoid occasional skin necrosis and non-specific reactions in highly sensitive patients.—R. E. Glover.

Legezynski, S., & Rafinski, K. (1933). Próba antygenowa Holtha w rozpoznawaniu ronienia zakaznego bydla. [**Holth's Reaction in Diagnosis of Contagious Abortion**].—*Przeglad Wet.* **46.** 411-417. 3 tables. [4 refs.] [French summary : abst. from orig.]

With material from 55 placentas and foetuses, the authors attempted to ascertain the value of the complement-fixation test with Holth's antigen and to compare it with microscopic, cultural and serological methods. Tests with normal rabbit serum were carried out in order to exclude results due to non-specific factors. As material for the antigen, boiled extracts from the placenta or stomach content or liver, lungs or spleen of the foetus, and uterine exudate were used. The results were positive in 23 cases, marked in one case and negative in 31 cases. It is emphasized that Holth's test is strictly specific and more delicate than microscopic and cultural methods and, although it is less clear with stomach content

antigen, it is quite reliable for the diagnosis of contagious abortion. Putrefaction of the test material does not affect the results.—K. Szczudlowski (Lwów).

. (1934). Brésil. Prophylaxie de la fièvre ondulante. [**Prevention of Brucella Infection in Brazil**].—*Bull. Off. internat. Epiz.* **7.** 1212-1215.

The recommendations of the committee appointed by the state of São Paulo to report upon methods of dealing with *Br. abortus* infection in cattle and *Br. melitensis* infection of goats.

The recommendations are on orthodox lines and refer to eradication by segregation. Vaccines of all types are condemned. Measures for preventing human infection are also included.—J. E.

Herrmann, O., Mirsabekjan, A., & Megrabjan, R. (1934). Banginfektion bei Studenten und etliche Laboratoriumsansteckungen. [**Infection of Students and Laboratory Workers with** *Br. abortus*].—*Zschr. Immun.-forsch.* **81.** 500-510. [39 refs.]

The authors describe four cases of *Br. abortus* infection in workers at a veterinary laboratory and give the results of agglutination tests on 673 persons, chiefly veterinary students, coming into contact with infection. Of these, 42 (6·3 per cent.) gave positive and 91 (13·5 per cent.) doubtful reactions. These cases are discussed with reference to the clinical findings.

The authors consider that a reaction at a serum titre of 1 : 50 in persons showing symptoms may be taken as positive, but that persons in good health, even though they may react at a titre of as much as 1 : 5,000, are not to be regarded as infected, but on the contrary as having acquired a strong immunity from contact with infection. The agglutination test alone is considered, therefore, as of limited value in detecting actual infection.—J. E.

Moreno, L. S. (1934). Necesidad de intensificar esta lucha desde un punto de vista ordenado y científico. [**The Necessity for Intensifying the Campaign against Brucella Infection in Man in a Systematic and Scientific Manner**]. —*Rev. Hig. y San. pec. Madrid.* **24.** 5-30. 7 figs., 15 tables. [57 refs.]

Previous reports have made it clear that brucella infection of goats in Spain is a serious problem. In one district where the author has studied the epizootiology of the disease, 144 cases of undulant fever in human subjects were confirmed from 1929 to 1932. Early in 1931 an alarming number of cases appeared in a village in this district with a population of 6,904. Thirty-four cases of undulant fever were confirmed ; four of the subjects were goatherds, 29 were known to have partaken of goats' milk, and the other had handled goats. There were 753 milking goats in the district.

When control measures were first undertaken the onus of maintaining the animals free from infection was placed upon the owners, who were expected to send blood samples to a laboratory and to pay for the examination. This was a complete failure, and the disease extended. All the goats were then subjected to the agglutination test and all herds proved to be infected. The percentage of infection among the goats in the district was 11·5. All the infected goats were found to have been brought into the district by dealers at a recent date. The infected animals were divided into two groups : those reacting at a titre higher than 1 : 50 were slaughtered, while those reacting at 1 : 50 were retested a month later. The plan does not appear to have been completely successful. The author's explanation is that animals reacting at a low titre perpetuated the disease. No further tests of animals which failed to react are recorded.

In another village the incidence of undulant fever over one year was 3·35 per 1,000. Twenty-two out of 102 goats were found to be infected. In this case all reactors were slaughtered and no further cases of undulant fever appeared.

The author's suggestions for the control of the disease are mainly of local interest, but the principles are the slaughter of reacting goats and prohibition of movement without a certificate for a negative agglutination reaction.

—R. S. Roberts.

de Apraiz y Buesa, L. (1934). Dos brotes epidémicos de fiebre de Malta en zona indemne. Estudio de la epidemia de fiebre de Malta acaecida en los pueblos de Nanclares de la Oca y Víllodas (Alava), durante los meses de marzo a septiembre de 1933. **[Two Outbreaks of Undulant Fever on Virgin Soil. Study of Undulant Fever in Nanclares].**—*Rev. San. e Hig. publ. Madrid.* **9.** 325-340. 6 figs., 1 map. [Copied *verbatim* from *Bull. Hyg.* **9.** 621. Signed by J. D. Rolleston].

A record of two epidemics of undulant fever due to *Brucella melitensis* in neighbouring villages in the province of Alava in the North of Spain.

The cattle and sheep were in a healthy state but there was an epizootic of undulant fever among the goats, which had probably originated from the introduction of an infected male goat from the Marquinez district. The epizootic was followed by an epidemic at Nanclares where the incidence was 481 per 10,000 inhabitants and at Villodas where it was 571 per 10,000. The mortality was 70 per cent. These figures may require rectification as the epidemic has not yet come to an end. The epidemic started immediately after the period of parturition for the goats. The chronological distribution of the cases as well as the distribution according to age and sex and the habits of the population eliminated the possibility of the disease having been spread by milk and suggested that infection was conveyed by direct contact with the goats and their excreta. Wholesale vaccination of the population was carried out but the results were disappointing.

Beattie, C. P., & Rice, R. M. **Undulant Fever Due to Brucella of the Porcine Type – *Brucella suis*. Report of a Milk-borne Epidemic.**—*J. Amer. Med. Ass.* **102.** 1670-1674. [18 refs.] [Copied *verbatim* from *Bull. Hyg.* **9.** 620. Signed by G. S. Wilson].

During the months of February, March and April 1933 a small outbreak of undulant fever occurred in a certain town in Iowa. Of the 30 persons affected, twenty-seven, distributed in 18 different households, obtained their milk from one dairyman, who supplied 80 households with raw milk. *Br. abortus* of the porcine type was isolated from the blood of six out of fourteen patients examined, and from the milk of one of the cows in the herd. This cow had never aborted but had previously been in contact with aborting sows. The sale of milk from the dairy was stopped, and the last case of undulant fever occurred 13 days later. It is noteworthy that none of the patients had had contact with animals or handled raw meat, so that the incrimination of the milk supply seems to be amply justified. From the high proportion of persons consuming the milk who developed undulant fever, it is concluded that the porcine type of *abortus* is of greater virulence to man than the bovine type.

I. Venske, W. (1933). Ueber das Vorkommen von Keimen aus der Paratyphus-Enteritis-Gruppe und von Uebergangsstämmen (Intermediusgruppe) bei Hunden und Katzen. **[Bacteria of the Paratyphoid Group and Transitional Strains (Intermediate Group) in Dogs and Cats].**—*Zlb. Bakt. I. (Orig.).* **130.** 259-264. 1 table. [28 refs.]

II. Edwards, P. R. (1934). **Salmonella aertrycke in Colitis of Foals.**—*J. Infect. Dis.* **54.** 85-90. 2 tables. [17 refs.]

III. Verge, J. (1934). Présence du bacille d'Aertrycke chez deux Chiens atteints de la maladie de Carré. [*Bact. aertrycke* **found in Two Dogs Affected with Distemper**].—*Bull. Acad. vét. France.* **7.** 71-74. [11 refs.]

I. 552 samples of faeces from 163 dogs, and 48 from 18 cats suffering from various diseases, have been examined for organisms of the paratyphoid group. All gave negative results, although 63 strains of coliform bacteria were isolated, which appeared to be of an intermediate variety. Five types were obtained which differed from the paratyphoid group by production of indol, fermentation of sucrose or lactose.

II. Infectious colitis occurred amongst a group of 28 suckling foals in Kentucky. The infected animals were aged from three to seven months. *Bact. aertrycke* was isolated from six fatal cases, and from a proportion of recovered cases. No further cases developed after treatment with a vaccine prepared from one of the isolated strains. The source of infection was not determined. The interest lies in the rarity of infection of the equine species with a member of the salmonella group other than *Bact. abortus equi.*

III. The author has isolated, from the respiratory tract of two dogs suffering from distemper, bacteria which morphologically, biochemically and serologically resemble *Bact. aertrycke.* Direct agglutination experiments only are recorded and cultures of the bacteria were non-pathogenic for dogs, rabbits and guinea pigs. Attention is drawn to the possible danger to human beings.—R. Lovell.

—. (1933). **Immunization against Equine Infectious Abortion and the Treatment of Mares and Foals for Parasitic Infestation.**—*Vet. Bull. U.S. Army.* **27.** 114-116.

This paper contains recommendations for the control of equine contagious abortion by means of serological tests and immunization with bacterins prepared from *S. abortivo-equinus* [*Bact. abortus equi*].

The sera of all breeding animals are submitted at the beginning of the breeding season to the agglutination and complement-fixation tests for the presence of *Bact. abortus equi* antibodies. Animals that pass these tests are given three subcutaneous injections of bacterin, at intervals of five days, in doses of 2, 3 and 5 c.c. respectively.

A short account is given of a rough sugar flotation method of testing for worm infestation in horses, advocating the treatment of all horses that are found to be infected. Carbon tetrachloride is considered to be safer than oil of chenopodium and is even recommended for unweaned foals in doses of 5 to 10 c.c. This should not, however, be given before they are ten weeks old and the second dose of 12 to 16 c.c. recommended for weaned foals should not be given until they have recovered from the weaning. [Most authorities are guarded about the treatment of such young animals and it would be advisable to proceed with caution in following these recommendations.]—T. M. Doyle.

Wagener, K. (1934). Infektionsversuche mit dem Bakterium pullorum beim Schwein. [**Experimental Infection of Pigs with** *Bact. pullorum*].—*Deuts. tierärztl. Wschr.* **42.** 180-181. [1 ref.]

The author tried, without success, to infect two pigs over a period of seven months by feeding them with the carcasses of hens which had died from *Bact. pullorum* infection, and with culture, and by the subcutaneous inoculation of *Bact. pullorum.* The pigs were then killed, but no lesions attributable to the organism could be found and no cultures could be grown from the organs.—J. E.

Ko, R., & Chin, S. J. (1933). **A Simple Method of Differentiating the B. suipestifer from Other Closely Related Bacteria.**—*Kitasato Arch. Exp. Med.* **10.** 220-225. [9 refs.] [Orig. in English].

The authors found that 25 strains of *Bact. suipestifer* from pigs and two from human beings produced a brown colour on agar, whilst certain other bacteria of the paratyphoid group (*Bact. paratyphosum* A and B, *Bact. abortus equi*, *Bact. typhimurium* and *Bact. enteritidis* Gärtner) did not. The authors thought that the brown colour might be due to the peptone in the medium and, on testing various brands, it was found that it was only produced when Teruuchi's peptone was used and that it was most noticeable when this peptone was used in a strength of 3 to 6 per cent. of the agar at a pH between 6·5 and 7·5.—J. E.

Berge, R., & Schoop, G. (1933). Spirillen als Ursache für seuchenhaften Verlammen. [**Spirilla as the Cause of Contagious Abortion in Sheep**].—*Deuts. tierärztl. Wschr.* **41.** 65-68. 2 figs., 1 table. [24 refs.]

This article records an outbreak of abortion in a flock of sheep in which 193 out of 368 ewes aborted. Spirilla could be detected in the foetuses and agglutinins could be demonstrated in the ewes after abortion. The significance of the names " vibrio " and " spirillum " is discussed and the organism is classed as a " spirillum," as terminal flagellar tufts were observed and as it is strictly anaerobic like other spirilla.

The organisms were present in the abomasal contents of the foetuses and could be demonstrated by anaerobic cultures on glucose agar plates. Sub-inoculation of guinea pigs could also be used to demonstrate the organism, but mice were resistant to infection. Examination for *Brucella abortus* and *Bacterium abortus ovis* gave negative results, and no organisms could be detected in the after-birth or cotyledons.

The serum of sheep after abortion caused agglutination of the spirilla at a dilution of 1 : 500, whilst the serum of normal sheep gave no agglutination.

—U. F. Richardson.

Sasaki, S. (1934). Anaerobe Bakterien im Boden. [**Anaerobic Bacteria in Soil**].—*Zlb. Bakt. I.* (*Orig.*). **131.** 211-212.

Examinations for anaerobic bacteria were carried out on 166 soil samples from Central Japan. Samples were collected from a large variety of places including streets, gardens, bamboo groves and sea shores. *Clostridium welchii* was found in all samples, *Cl. oedematiens* in 60 per cent., *Cl. septique* in 20 per cent. and *Cl. tetani* in 11 per cent. of all samples.—E. J. Pullinger.

Hall, W. W., & Scott, B. V. D. (1934). **Botulism.**—*U.S. Nav. Med. Bull.* **32.** 162-170. [Copied *verbatim* from *Bull. Hyg.* **9.** 551. Signed by W. G. Savage].

The first part of the paper consists of a good general account of botulism while the second gives details of an outbreak involving two cases. Both cases were males infected November 1932. The symptoms are described in detail and strongly suggest botulism. One patient died. A study of the meals consumed cast suspicion on warmed up turkey soup and on home-canned figs, as these were eaten by both the men and not by the others. The fact that a chicken which probably ate the fig remains developed " limber neck " [fowl botulism] suggests the canned figs as the vehicle. None of this tin contents was available for laboratory examination and other samples were negative. No bacteriological examinations from the two patients are recorded so there was no bacteriological confirmation.

Beveridge, W. I. B. (1934). **A Study of Twelve Strains of *Bacillus necrophorus*, with Observations on the Oxygen Intolerance of the Organism.**—*J. Path. & Bact.* **38.** 467-491. 3 tables. [56 refs.]

The name *Bacillus necrophorus* is used by the author as he considers the generic names *Fusiformis* and *Actinomyces* inappropriate.

Of the 12 strains studied, six were isolated from abscesses in bovine livers and six from cases of "jaw disease" in members of the genus *Macropus* (kangaroos and wallabies) either by direct culture on serum agar or by culture following rabbit inoculation. The general characters agreed very closely with those described by previous investigators and, despite slight differences between the strains in morphology and cultural characters, there is ample justification for grouping them as a single species.

The most marked differences occur in the cross-agglutination tests where two well-defined serological groups were shown to exist. One group comprised five bovine and one *Macropus* strain and the other group, three *Macropus* strains. Of the three remaining strains, the bovine strain showed a slight association with the first group whereas the two *Macropus* strains were not related to either group.

A soluble toxin and an endotoxin which was very resistant to heat and chemical agents were produced by the organism.

Experiments on the oxygen intolerance of the organism showed that, although the organism is believed by most investigators to be a strict anaerobe, colonies which had developed under anaerobic conditions continued to grow when placed under aerobic conditions. In a few cases subcultures were obtained aerobically. Exposure to the air for 48 hours at about 15°C. proved fatal to 24-hour cultures of all 12 strains, but a subsequent experiment revealed that the presence of *Staphylococcus aureus* rendered *Bacillus necrophorus* relatively insusceptible to air. This probably explains the survival of *B. necrophorus*, a non-sporing anaerobe, outside the body, its widespread existence being doubtless responsible for the numerous sporadic cases of infection in domestic animals.

In seeking some explanation of this phenomenon of resistance, the author is led to the conclusion that the survival and proliferation of *B. necrophorus* is dependent to some extent upon the relative rate of (a) peroxide and catalase formation and of (b) oxidation and reduction, these being influenced by the presence of contaminating organisms such as *S. aureus*.—Gwilym O. Davies.

Rolle, M. (1934). Hefe als Ursache für Euterentzündungen bei Kühen. [**Yeast as Cause of Mastitis in Cows**].—*Deuts. tierärztl. Wschr.* **42.** 385-386.

Rolle gives details of two out of five cases of mastitis due to yeasts which he observed in a period of two years, and of the symptoms produced in a cow which he infected experimentally. Mastitis due to yeasts may occur in cows which are fed on brewers' grains or sour chopped roots. The symptoms may be mild or severe but the milk is definitely altered. The inflammatory symptoms disappear spontaneously but a significant lowering of yield remains. It is suggested that in smears the yeast cells may be mistaken for small lymphocytes.—A. W. Stableforth.

I. Lebasque. (1934). Recherches morphologiques et biologiques sur les *Trichophyton* mégasporés du Cheval et du Boeuf. [*Trichophyton* **of the Horse and Ox**].—*Bull. Acad. vét. France.* **7.** 112-114.

II. Seehawer. (1934). Mykologische Untersuchungen über die in Hoppegarten beobachtete Trichophytie der Rennpferde. [*Trichophyton* **Ringworm of Race Horses at Hoppegarten**].—*Zschr. Veterinärk.* **46.** 180-194. 3 figs. [20 refs.]

I. Working with six strains of *Trichophyton* collected from cattle and horses, the author applied the technique of cultivation on natural medium (e.g. cereal grains and horse-dung) described by BROCQ-ROUSSEU, URBAIN and BAROTTE. It was found that strains normally producing glabrous colonies could be made to produce downy colonies on such media ; in addition, the strains of *T. equinum* and *T. ochraceum* produced spores and spindle bodies, whilst *T. album* and *T. discoides* also produced spiral bodies.

Three new species of *Trichophyton* are described :– (1) *T. villosum*, from cattle in Annam and Tonkin, producing downy colonies, spores, spindle and spiral bodies ; (2) *T. bullosum*, from horses in Syria and North Africa, and (3) *T. papillosum*, from horses in Syria and Morocco. The latter two species produced downy colonies, spores, and spindle bodies.

The fact that *T. megasporon* grows so successfully on natural media, producing the characteristic differentiated organs of the dermatophytes, supports the hypothesis that these fungi can, under suitable conditions of warmth and humidity, exist and develop saprophytically in stables and byres.

II. Some of the literature referring to ringworm is discussed and a classification of the fungi is given. Symptoms of infection, corresponding fairly closely to classical text-book descriptions of *T. equinum* infection in the horse, are recorded. For identification of the fungus, attention was paid to a microscopic examination of infected hairs and hair follicles by hanging drop and staining methods, the rapidity and type of growth of the fungus on special media, and to animal inoculation experiments. Sections dealing with mycological technique are unsuitable for abstraction, but the methods described do not differ from those of standard text-books.

Evidence is presented to show that there is no such thing as absolute immunity to ringworm, though it is possible that some rise of immunity may follow infection. Cases of laboratory infection of human beings are quoted.—E. J. PULLINGER.

I. BURN, C. G. (1934). **Experimental Studies of Postmortem Bacterial Invasion in Animals.**—*J. Infect. Dis.* **54.** 388-394. 9 tables. [3 refs.]

II. BURN, C. G. (1934). **Postmortem Bacteriology.**—*Ibid.* 395-403. 10 tables. [1 ref.]

I. In order to gain some information on this subject, the author injected suspensions of known bacteria into the various tissues and body cavities of killed guinea pigs and rabbits and attempted to isolate the organisms from the internal organs after the animals had been kept at various temperatures for different periods of time. In this way he found that *Clostridium welchii*, *Bact. coli*, and staphylococci invaded the internal organs within 5 to 48 hours when the animals were kept at 25°C. but not when kept at 10°C. A large number of pathogenic and non-pathogenic organisms failed to invade the tissues even when ample opportunity was afforded.

II. This paper gives the data collected following cultural examinations made at 127 human autopsies in the general hospitals of the north-eastern part of the United States. The subjects were selected at random.

The organisms most frequently isolated, apart from those associated with specific diseases, were *Bact. coli*, staphylococci, streptococci (non-haemolytic) and *Cl. welchii*. They were most commonly isolated from the lungs, kidneys, liver, spleen and heart blood in the order named. The incidence of bacterial growth was very high, 111 cases out of 127 yielding cultures in a minimum of four organs.
—GWILYM O. DAVIES.

DISEASES CAUSED BY PROTOZOAN PARASITES.

Mettam, R. W. M. (1933). **Trypanosomiasis. Redwater. Anaplasmosis. Blood Parasites of Wild Game. Chemotherapy of *Babesia canis* Infection in Dogs.**—*Ann. Rep. Vet. Dept. Uganda. 1932.* pp. 25-32. 1 table.

The sections of the report of the veterinary pathologist which deal with trypanosomiasis record experiments on the susceptibility of wild game to trypanosomes pathogenic to domestic stock. Apart from the blue forest duiker and the ordinary duiker, game were definitely resistant to infection with *Tryp. congolense*. All the species inoculated were readily infected with *T. brucei*, but no toxic symptoms were observed except in the blue forest duiker and the jackal [this *Bull.* **4.** 610]. For the maintenance of strains of *T. congolense*, the cat, in which the disease runs a chronic course, was found to be the most satisfactory animal. The infection of rats and guinea pigs could rarely be accomplished until a strain had been passaged several times through cattle and cats. Fowls were resistant to this trypanosome.

Two animals, which were given injections of " antimosan " five days before and five days after inoculation with blood containing *T. congolense*, failed to develop infection, but the number of animals under experiment was too small to permit of definite conclusions.

" Antimosan ", given in four doses of 40 c.c. each, at intervals of eight days, failed to cure a calf infected with *T. congolense*, and similar treatment failed to cure two infected sheep and an infected goat [this *Bull.* **3.** 353]. Satisfactory results are recorded from the use of " Bayer 205 " in the treatment of *T. brucei* infections in cats and dogs.

Redwater appears to be enzootic in Uganda and is said to be of little economic importance, but it is sometimes encountered in cattle reacting to double inoculation for rinderpest and may be associated with grave symptoms. Anaplasmosis is also enzootic and is responsible for chronic anaemia, prolonged debility and stunted growth in calves, although the mortality rarely exceeds 5 per cent.

Infection with *Thieleria mutans* is apparently widespread and is said to cause no inconvenience to the host. Parasites are encountered in the blood during immunization to rinderpest or in cattle reacting severely to pathogenic trypanosomes. Schizonts have been observed in the spleen and glands of animals harbouring the parasite.

In view of recent advances in the knowledge of theileriasis, a reinvestigation was made into East Coast fever as encountered in Uganda, and it was concluded that it is similar to the disease of South and East Africa, and not to the theileriasis of North Africa. The reactions of local animals, exposed to pastures infested with infected ticks, varied from disease as severe as that encountered in imported cattle to a slight febrile attack. The severity did not appear to be dependent upon breed, but purely upon individual resistance. No relapses to East Coast fever were observed in hundreds of animals immunized against rinderpest.

Theileria were detected in several antelopes and one Koch's body was seen in a brown duiker, but blood inoculation from these animals into calves gave negative results, as also did attempts to infest calves with ticks collected from game. Young antelopes exposed on pastures infested with East Coast fever ticks failed to contract any infection.—U. F. Richardson.

Donatien, A., Lestoquard, F., Sausseau, E., & Maubaret, P. (1934). Transmission de *Piroplasma caballi* de la mère au foetus. [**Transmission of *Babesia caballi* from Dam to Foetus**].—*Bull. Soc. Path. exot.* **27.** 433-435. [7 refs.]

The authors describe a case in which the blood of a five-day-old mule contained *B. caballi*, which had been seen in the mare's blood the day before parturition. As the incubation period for *B. caballi* is at least ten days, the authors consider this to be an undoubted case of transmission *in utero*.

It is already known that members of the genera *Babesia*, *Theileria* and *Anaplasma* can be transmitted from mother to foetus.—J. E.

I. Reinhardt, R. (1934). Kokzidiose bei Hunden und Katzen. [**Coccidiosis of Dogs and Cats**].—*Berl. tierärztl. Wschr.* **50.** 433-434. 3 figs. [6 refs.]

II. Yakimoff, W. L. (1934). Eimeria exigua n.sp. eine neue Kaninchenkokzidie. [*Eimeria exigua* **n.sp., a New Coccidium of the Rabbit**].—*Zlb. Bakt. I. (Orig.).* **131.** 18-24. 4 figs., 6 tables. [21 refs.]

III. Iwanoff-Gobzem, P. S. (1934). Die Kokzidiose der Kamele. [**Coccidiosis of the Camel**].—*Zschr. Infektkr. Haust.* **46.** 1-4. 2 figs., 4 tables.

IV. Yakimoff, W. L., & Gousseff, W. F. (1934). Zur Lysis der Coccidienoocysten. [**Lysis of Coccidial Oocysts**].—*Münch. tierärztl. Wschr.* **85.** 341-342. 4 figs. [4 refs.]

I. Four out of 125 dogs showed coccidial oocysts in their faeces. *Isospora rivolta* and *Eimeria canis* are the species which commonly infect dogs. Fourteen of 75 cats were found to be infected, *I. rivolta* being the species usually encountered.

Symptoms of infection include derangement of appetite and bloating of the abdomen, which is sensitive to palpation. Later there is a persistent, slimy, fluid diarrhoea ; condition falls off and anaemia becomes apparent. A slight infection can occur without obvious symptoms. Diagnosis is confirmed by the demonstration of oocysts in the faeces.

Treatment includes attention to hygienic precautions in order to prevent re-infection of the patient, or spread of the condition to other animals. Dosage with 1 per cent. solutions of methylene blue, medicated charcoal, or powdered chincona are recommended.

II. A new coccidium, *E. exigua*, is described as a parasite of rabbits. The oocyst is round or oval in shape, the size being 15·7 × 12·2μ (oval) or 13·6μ (round). There is no micropyle, nor residual body in the oocyst. The sporulation time has not yet been ascertained.

III. The camel is subject to coccidiosis, the infecting organism (*E. cameli*) being specific for these animals. The oocyst is oval or round (23·3 to 34·3μ × 20·1 to 33·6μ), residual bodies are only found in the sporocysts, there is no micropyle and the sporulation time is about eight days.

IV. Lysis of coccidial oocysts was found to have occurred in samples of infected faeces which had been stored for one week. This phenomenon was misleading when attempts were made to classify the coccidia, as the released sporocysts were, temporarily, mistaken for oocysts.—E. J. Pullinger.

Fukushima, T., & Isskiki, O. (1933). Beitrage zur Kenntniss von Globidium-Invasion beim Kalb. [**A Contribution to our Knowledge of** *Globidium* **Infection in the Calf**].—*8th Rep. Govt. Inst. Vet. Res. Fusan, Japan.* pp. 111-114. 2 figs. (6 refs.) [Orig. in German].

This article records the infection of the conjunctiva of a calf by *Globidium*. Clinical observation revealed lachrymation, capillary injection and miliary greyish-white specks. On microscopic examination the lesions were found to exhibit hyperplasia of fibroblasts and slight infiltration of lymphocytes. Two different types of *Globidium* could be demonstrated, one resembled the form described by Hadwen and Franco, whilst, in the other, forms were encountered with loose

contents resembling fibroblasts. The organisms appeared to leave the spherical cysts and invade the tissues.—U. F. RICHARDSON.

I. MORGAN, E. (1934). **Anaplasmosis in Cattle in Venezuela.**—*Vet. J.* **90.** 291-295.

II. MURRAY, R. B. H. (1934). **Some Notes on the Treatment of Anaplasmosis with Novarsenobillon.**—*Vet. Rec.* **14.** 854 and 855.

III. HALL, M. C. (1934). **A Stalemate in the War on Anaplasma.** *North Amer. Vet.* **15.** No. 8. 48-52. 1 fig.

I. This article records an outbreak of anaplasmosis in a herd of Friesian cattle in Venezuela. The pure-bred cows and heifers which were turned out into paddocks suffered from the disease, whilst the bulls, quarter-bred native cows and calves, which were kept housed, escaped.

About a dozen animals recovered on treatment with oral administration of 1 lb. of common salt. If this failed to relieve constipation several litres of physiological saline were injected intramuscularly. Injections of " arrhenal " were also given in some cases. Fifteen animals treated with trypaflavine, antimosan and other drugs died.

II. This note records the treatment of an Ayrshire bull infected with *Anaplasma marginale* in Uganda. A febrile attack occurred and was treated by the administration of magnesium sulphate ; the attack subsided, but on the ninth day a further rise of temperature occurred, and on the tenth day the animal was in a state of collapse, the temperature being 105° F. 1·8 g. of novarsenobillon was injected intravenously, and on the following day the fever had subsided, and the appetite returned. The temperature remained normal for the 19 days during which the animal was kept under observation. Seven calves treated by the same method recovered, whilst six calves left as controls died.

III. This article sketches the position in the United States of America with regard to the control and eradication of anaplasmosis. The campaign against redwater, involving the destruction of *Boophilus annulatus* and *B. annulatus australis*, has not reduced the areas in which anaplasmosis is enzootic. Further work has ascertained that anaplasma can be transmitted by six varieties of ticks, nine varieties of biting flies and also by surgical instruments, such as might occur with the use of hypodermic needles and dehorning tools. No effective method of eradication is available at present, though the destruction of ticks and flies may be of some value in reducing the spread.

The author considers that the most effective method of eradication should be the destruction of the vertebrate hosts, but before this can be adopted some method must be discovered by which infected animals can be detected at any stage of infection.—U. F. RICHARDSON.

I. TWINN, C. R. (1933). **The Blackfly, *Simulium venustum* Say, and a Protozoan Disease of Ducks.**—*Canad. Entomol.* **65.** 1-3. [6 refs.]

II. O'ROKE, E. C. (1934). **A Malaria-Like Disease of Ducks Caused by *Leucocytozoon anatis* Wickware.**—*Univ. Michigan, School Forestry & Conservation Bull.* No. 4. pp. 44. 21 figs. on 5 plates, 1 table. [17 refs.]

I. This paper contains notes on the biology of *S. venustum* and records its distribution in Canada, where it is widespread, and where *L. anatis* infection of ducks is also prevalent. The fly breeds in running water, rivers or even drainage ditches, the larvae and pupae being particularly abundant in the spring and early summer in rapids and broken water, attached to rocks, aquatic plants or debris. The adults are on the wing from May to October, being particularly prevalent in

June and early July. Observations indicate that hibernation takes place in the larval stage, the larvae being protected from the extreme cold by the ice which covers the rivers.

II. This article records the results of three years' investigations in Michigan into the disease of ducks due to infection with *L. anatis*. The disease attacks both wild and domestic ducks and is most severe in ducklings, in which the mortality varies from 10 to 100 per cent. ; in adult ducks it is less than 1 per cent. The severity of outbreaks seems to depend upon the number of infected birds present and on the prevalence of the carrier, the blackfly, *S. venustum*. All the serious natural outbreaks studied were in ducklings, ten days to four weeks old, in the hottest part of July. The outstanding characteristic of leucocytozoon disease is its suddenness of onset. A flock of ducklings may appear well in the morning and by mid-afternoon be noticeably lethargic and refuse food. The next morning some will be dead. Some show symptoms of excitement, others weaken progressively and die after minor convulsions. Infected adults are listless, but do not exhibit symptoms of excitement.

The parasites seen in the blood of the duck are in the gametocyte stage, appearing first as spherical bodies in hypertrophied red blood corpuscles and later as spindle-shaped nucleated bodies, about 14·5 to 22μ long in an attenuated host cell which is about 50μ long. In the stomach of the fly the parasites pass through the stages of gamete, zygote, ookinete and oocyst to the sporozoite, which is the form transmitted to the duck. This sexual cycle is completed in one to five days. Five days after the ducks have been bitten by infected flies, clusters of merozoites can be recognized in schizonts in the endothelial cells of the blood capillaries of the lung, liver and spleen. Gametocytes first appear in the blood seven days after infection and grow to maturity on the tenth day.

The parasites are maintained over the winter in carrier ducks from which they are transmitted to the new broods in the following year.

Attempts at curative and prophylactic treatment with quinine and plasmoquine were unsatisfactory. The disease can be controlled by examining the flock and removing any adult ducks that are carriers. All infected young ducks should be removed before they become infective to the fly. Ducklings hatched early in the year are old enough in July to withstand the disease and late hatched ducklings also avoid the worst season. Finally, ducklings can be raised in areas free from the blackfly or they can be completely screened from the attacks of the fly.

—U. F. Richardson.

Tarejew, E. M., & Poutchkova, A. I. (1933). Sur l'exploration fonctionelle du système réticulo-endothélial dans le paludisme. [**Investigation on the Function of the Reticulo-Endothelial System in Malaria**].—*Riv. Malariol.* **12.** 859-872. [17 refs.] [English summary (9 lines) p. 1063.] [Copied *verbatim* from *Trop. Dis. Bull.* **31.** 458. Signed by W. F.]

The Congo-red test did not demonstrate clearly a blocking of the R.E. system in malaria.

The importance of the reticulo-endothelial system in immunity is well established. Natural immunity is lowered by its blockage ; for example, Kritchevsky inoculated mice with a strain of Dutton's spirochaete which was non-pathogenic, but when the R.E. system was blocked with saccharated iron the infection killed 46 per cent. ; or, if the spleen was removed at the same time, 90 per cent. Similar results have been obtained with monkeys infected with non-pathogenic malaria parasites (see Krishnan, Smith & Lal, *ante*, p. 179). In human malaria there is a blockage of the R.E. system by melanin, and Ruge attributes the lack of com-

plete immunity to this cause. In order to test the capacity of the R.E. system Adler has employed intravenous injections of Congo-red, a nondiffusible substance which is removed from the blood by this system. The co-efficient of Congo-red is the percentage which remains in the blood, one hour after the inoculation of 10 c.c. of a 1 per cent. solution. The authors found this to be between 65 and 66 in non-malarious subjects. They expected to find a high index in malaria owing to failure of the blocked R.E. system to take up the Congo-red; but they were disappointed for in acute and severe cases the index was approximately normal. In non-complicated malaria there was a tendency for the index to decline and for the monocytes to increase as the health of the patient improved, and it is suggested that this may be a manifestation of immunity.

Schwarte, L. H. (1934). **Infectious Enterohepatitis of Turkeys.** *J. Amer. Vet. Med. Ass.* **84.** 184-188.

This article gives a general account of the aetiology, clinical symptoms and the method of control of blackhead in turkeys. Fowls, grouse, quail and other birds are susceptible to infection by *Histomonas meleagridis* and may act as carriers of the parasite. Infection in turkeys occurs from picking up the droppings of diseased birds. The protozoa have little resistance to conditions outside the body, but they are said to enter the eggs of *Heterakis papillosa* (the caecal worm) and thus obtain protection from cold and desiccation. When the infected eggs hatch in the caecum the protozoa are liberated and invade the tissues. The lesions are usually confined to the caeca and liver. An experiment is reported in which abligation of the caeca prevented infection in 60 birds, though 37 out of 45 controls running on the same ground contracted the disease. The operation, however, is delicate and is usually attended with a high mortality.—U. F. Richardson.

Tyzzer, E. E. (1934). **Studies on Histomoniasis or "Blackhead" Infection, in the Chicken and Turkey.**—*Proc. Amer. Acad. Arts & Sci.* **69.** 189-264. [Copied *verbatim* from *Helminth. Abst.* **3.** 45. Signed by T. W. M. C.]

Tyzzer in his detailed studies on Blackhead shows conclusively that the organism may be carried by the embryonated eggs of *Heterakis*; although the organism has not yet been recognized microscopically in the egg, he finds it in the intestinal epithelium of the worm. He finds that large numbers of *Heterakis gallinae* developing in the caeca of young chickens produce *per se* a characteristic helminthic typhlitis.

Waller, E. F. (1934). **A Preliminary Report on Trichomoniasis of Pigeons.**—*J. Amer. Vet. Med. Ass.* **84.** 596-602. [9 refs.]

Holstein. (1934). Trichomoniasis beim Rind. [**Trichomoniasis in Cattle**].—*Tierärztl. Rdsch.* **40.** 323-325. [8 refs.]

The first article records the detection of trichomoniasis of pigeons in North America. Adult pigeons were found to be immune and 24 out of 27 birds examined had a trichomonad invasion of the crop. Typical trichomoniasis, with lesions in the liver, pancreas, peritoneum and lungs, could be produced in young pigeons by the injection of infected material into the crop, veins or liver. An attempt was made to infect chickens by feeding infected material and by rectal injections, but no infection could be detected.

The pigeon trichomonads were cultivated in a modified Locke's solution to which was added Löffler's dehydrated blood serum. Contamination of the cultures with *Bact. coli* or *B. subtilis* was not detrimental to the trichomonads, provided that

subcultures were made every 24 hours. Attempts to infect young pigeons by the inoculation of cultures were not successful.

The second article records further cases of trichomonad infection in cattle associated with abortion, pyometra and sterility. The question of the pathogenicity of the trichomonads is discussed and it is considered that they can no longer be regarded as harmless saprophytes. The author considers that trichomonad infection is probably the most common cause of sterility, early abortion and pyometra amongst the small herds of south and central Germany.

—U. F. Richardson.

I. Randall, R. (1934). **Studies in Surra. I. The Blood Chemistry in Equine Trypanosomiasis (Trypanosoma evansi).**—*Philippine J. Sci.* **53.** 97-105. 1 table. [14 refs.]

II. Taylor, W. (1934). **Surra in the Punjab.**—*Ind. J. Vet. Sci. & Anim. Husb.* **4.** 29-35. [12 refs.]

III. Kunert, H., & Krause, M. (1934). Findet in Glossina morsitans eine zyklische Entwicklung des Trypanosoma evansi statt ? [**Is there a Developmental Stage of** *Tryp. evansi* **in** *Glossina morsitans* ?]—*Arch. Schiffs- u. Trop.-Hyg.* **38.** 257-259.

I. A record of investigations on the blood chemistry of horses inoculated with *T. evansi* and treated with subcurative doses of " naganol " in order to prevent the development of an acute infection. The blood was examined for carbon dioxide combining power, non-protein nitrogen, blood sugar, creatinine, lipoid phosphorus and calculated lecithin.

In one experiment " naganol " was given when the blood contained 2,200 trypanosomes per c.mm. Twenty-four hours later there were no trypanosomes in the blood, and the chemical findings had returned to normal, indicating that no endotoxin was liberated by the disintegrating trypanosomes capable of producing symptoms of toxaemia.

As infection progressed anaemia developed associated with acidosis, which was most marked at times of crisis. The blood sugar level was low at times of crisis, but after crisis might rise higher than normal. In one animal the blood sugar content was never markedly decreased, whilst in another, a content of 27 mg. per 100 c.c. 24 hours before death rose to 71 mg. half an hour before death. The results obtained support the theory that death is due to asphyxia from an uncompensated acidosis, the mechanism of which has not been clearly demonstrated.

II. A discussion on the treatment of horses and camels in the Punjab for surra. Excellent results have been obtained by treatment with " naganol " and tartar emetic, the latter being utilized on account of its cheapness. The routine treatment which has been adopted at the veterinary dispensaries consists in intravenous injections at intervals of four to five days. The first injection consists of 100 c.c. of 1 per cent. " naganol " solution followed by two injections of 100 c.c. tartar emetic solution, the first 1 per cent. and the second 1·5 per cent. A second injection of " naganol " at a strength of 1·5 per cent. is followed by two more injections of tartar emetic at strengths of 2 per cent. and 2·5 per cent. and a final injection of 100 c.c. of 2 per cent. " naganol."

In seven years 5,692 horses have been treated with a recovery rate of 87·6 per cent., and 2,135 camels with a recovery rate of 86·8 per cent. A course of treatment lasting a month may be unnecessary in camels, and equally good results might be obtained with a single dose of " naganol," as used in the Sudan, but the length of treatment ensures rest which is usually very beneficial.

III. A record of five experiments, in which over 700 *G. morsitans* raised in

captivity were fed on guinea pigs infected with *T. evansi* and then on healthy guinea pigs. No transmission of infection occurred except for a few days after the infective feed and it is concluded that this was mechanical and that no cyclical development was involved.—U. F. RICHARDSON.

CORSON, J. F. (1934). **A Further Note on a Strain of *Trypanosoma brucei* from Zululand.**—*J. Trop. Med.* **37.** 152-153. [Copied *verbatim* from *Trop. Dis. Bull.* **31.** 584. Signed by W. Y.]

This paper records further observations on the strain of *T. brucei* from Zululand. In his previous paper, Corson had drawn attention to the fact that infected rats live, in the earlier passages, usually for periods of from 60 to 200 days, and that in the case of one rat the infection remained latent for no less than 9 months. Six rats subinoculated from the blood of this rat shortly before its death all became infected and died in from 13 to 19 days. This increased virulence was maintained in subsequent direct passages in rats, thus clearly marking off this branch of the strain from the rest and giving a picture similar to that of a virulent strain of *T. rhodesiense*. Guineapigs could now also be infected. The strain had previously failed to infect them. As it has been suggested that cyclical passage modifies polymorphic trypanosomes by stabilizing their virulence or removing acquired characters, it was decided to pass the strain through *G. morsitans* and to observe whether this passage affected the recently acquired virulence. Laboratory-bred *G. morsitans* were fed on a guineapig which had been inoculated from an infected rat of the virulent branch of the strain. Two infected flies were isolated ; one was fed on the author, and subsequently on a series of rats, and the other infected fly was fed on rats. The author did not become infected, but all the rats did, and all developed an acute infection. Apparently, therefore no loss of virulence occurred as the result of cyclical passage.

POINDEXTER, H. A. (1933). **Observations on the Defense Mechanism in *Trypanosoma equiperdum* and *Trypanosoma lewisi* Infections in Guinea Pigs and Rats.**—*Amer. J. Trop. Med.* **13.** 555-575. [16 refs.] [Copied *verbatim* from *Trop. Dis. Bull.* **31.** 594. Signed by C. M. WENYON].

The injection of sugar into the peritoneal cavity of guineapigs producing an artificial hyperglycaemia favours the rate of reproduction of *Trypanosoma equiperdum* in the blood to such an extent that the incubation period after inoculation is shortened and death supervenes two to three weeks earlier than in control animals Injection of pilocarpin also shortens the incubation period and increases the number of trypanosomes in the blood of an infected animal, but this is due merely to contraction of the spleen, which is the most important organ of the reticulo-endothelial system in the defence against infection. Infection at first stimulates the haematopoietic organs, as indicated by a temporary increase in the red cells, an increase which is lost when haemolytic activity manifests itself. Infection in the pregnant guineapig is milder, though the offspring suffer. Towards the end of an infection there is a reduction in the number of trypanosomes associated with a destruction of red blood corpuscles producing anoxaemia which is largely responsible for the death of the animal. There is a significant decrease in the resistance of the red blood corpuscles as contrasted with a *T. lewisi* infection in which there is none. The change in size of the spleen of rats infected with *T. lewisi* is parallel to the change in guineapigs infected with *T. equiperdum*. An increase in the monocytes and platelets of the blood runs parallel with the increase in the size of the spleen in *T. lewisi* infections. Rats recovered from *T. lewisi* infection live longer when infected with *T. equiperdum* than control animals.

Eyraud. (1934). La dourine et sa prophylaxie. [**Dourine**—*Tryp. equiperdum* **Infection—and its Prevention**].—*Bull. Off. internat. Epiz.* **8.** 414-429. 1 table.

This article records the position in Morocco in regard to dourine. The number of cases diagnosed in recent years has increased considerably and, whilst only 16 cases were detected in 1929, 98 cases were recorded in 1933. For diagnosis, the author recommends the complement-fixation test using the stable alcoholic antigen of Zottner [this *Bull.* **4.** 621]. This test does not detect early cases; a negative reading was given with the serum of an animal which had been inoculated with *T. equiperdum* six days previously, and which exhibited a trypanosome invasion of the blood. Animals which have been treated and cured also give negative readings. It is considered that the disease could be eradicated by supervision of stallions with the regular use of serological tests, the castration of poor animals and the treatment of valuable ones, and the prevention of the infection of stallions by the frequent injection of small doses of "naganol." Previous to 1933, "naganol" had been used for the treatment of affected animals, but it has the disadvantages of toxicity, particularly when used on donkey stallions, and the necessity of a course of injections prolonged over 12 days. Recently two injections of "novarsenobenzol" given on two consecutive days, in doses averaging 3 g., has given good results. Of six experimental animals treated in this way, four recovered completely, one died and one made an apparent recovery, but the complement-fixation test remained positive. As a preventive, "naganol" can be given to stallions in doses of 0·006 g. per kg. body weight every 15 days, and to donkeys in doses of 0·005 g. per kg. body weight. It has been shown experimentally that this will prevent infection if inoculation is performed five days before, or six days after, the "naganol" injection.—U. F. Richardson.

I. Galliard, H. (1934). Les formes de multiplication de *Trypanosoma duttoni* Thiroux au cours d'infections mortelles chez la souris. [**Multiplication Forms of** *Trypanosoma duttoni* **in Fatal Infections in Mice**].—*Ann. Parasitol.* **12.** 273-277. 2 figs. [13 refs.]

II. Schwetz, J. (1934). Sur quelques trypanosomes rares de la région de Stanleyville. [**Rare Trypanosomes from Stanleyville**].—*Ibid.* 278-282. 4 figs. [3 refs.]

III. Corson, J. F. (1934). **The Cerebro-Spinal Fluid of Some Small Antelopes Infected with** *Trypanosoma rhodesiense*.—*Ann. Trop. Med. & Parasitol.* **28.** 243-244. 1 table.

IV. Browning, C. H., Cappell, D. F., & Gulbransen, R. (1934). **Experimental Infection with** *Trypanosoma congolense* **in Mice: The Effect of Splenectomy.**—*J. Path. & Bact.* **39.** 65-74. 6 tables. [19 refs.]

V. Reichenow, E. (1934). Die Züchtung der pathogene Trypanosomen. [**Cultivation of Pathogenic Trypanosomes**].—*Arch. Schiffs- u. Trop.-Hyg.* **38.** 292-302. 6 figs., 1 table. [12 refs.]

I. This article records acute fatal infections in mice due to *Tryp. duttoni* when superimposed on infection with *T. gambiense*. Large numbers of dividing forms of *T. duttoni* were encountered in the blood and forms resembling *T. cruzi* were found in the peritoneum.

II. This paper describes rare trypanosomes encountered in the blood of monkeys, lemurs, serpents and birds from the Stanleyville area of the Belgian Congo.

III. This note records the finding of trypanosomes in the cerebrospinal fluid of seven out of nine dik-diks and duiker which had been obtained from areas

free from tsetse fly, and infected experimentally with *T. rhodesiense*. The author considers that these animals may play some part in the spread of Rhodesian sleeping-sickness. In view of the severe disease produced by experimental infection, it is difficult to account for the survival of these species in sleeping-sickness areas.

IV. This article records observations on the behaviour of a strain of *T. congolense* maintained in mice. The trypanosome did not become fully accommodated to the host. A large inoculum was required to ensure infection. A chronic relapsing type of infection occurred in about 33 per cent. of animals and one case of spontaneous recovery occurred. No significant alterations in the course or severity of the infection were produced by splenectomy.

V. This article records further work on the cultivation of *T. gambiense*, *T. congolense* and *T. cruzi* in the Ringer-citrate-blood medium [this *Bull.* **4.** 26]. One strain of *T. gambiense* lost its power of development after 19 subcultures and another after seven subcultures. A strain of *T. congolense* developed in media made with goat blood or human blood, though it was shown that human blood did exert some deleterious influence on the infectivity of the trypanosome to rats. In the case of *T. congolense*, an old laboratory strain proved capable of developing in culture.

In neither of these species of trypanosomes did metacyclic trypanosomes develop in cultures, nor did the cultures become infective. The author considers that it will not be possible to culture indefinitely until a method is discovered of modifying the medium to allow of complete cyclical development such as occurs in infected glossinae.

T. cruzi also grew well on media made with human blood, but to get luxuriant growth it was necessary to add glucose. In the case of this trypanosome, the development cycle is completed in culture, and in five to six weeks trypanosome forms predominate in the cultures, which also become infective.

—U. F. Richardson.

Corson, J. F. (1933). **A Further Note on the Action of Normal Human Blood-Serum on *Trypanosoma rhodesiense* in Relation to Cyclical Passage through Tsetse Flies.**—*J. Trop. Med.* **36.** 378-379. [Copied *verbatim* from *Trop. Dis. Bull.* **31.** 582. Signed by W. Y.]

The experiment described in this paper was performed with the object of ascertaining whether increased susceptibility to human serum in a strain of *T. rhodesiense* was transmitted through tsetse flies.

A number of white rats and four guineapigs were infected by inoculation with the blood of a patient suffering from a recent infection of *T. rhodesiense*. Laboratory-bred *G. morsitans* were fed on the guineapigs, and the infection cyclically transmitted to white rats. The rats infected by inoculation from the patient's blood, and those infected from the guineapigs by the flies were injected with normal human serum. The results are given in a table, which shows that the increased susceptibility to human serum caused by passage of the strain through guineapigs was transmitted by *Glossina*, unless, as is possible, it was acquired in the flies.

Kunert, H., & Kunzmann, T. (1934). Die Beziehungen zwischen Trypanosomeninfektion und Blutrhodangehalt. [**The Relationship between Trypanosome Infection and the Blood Sulphocyanate Content**].—*Arch. Schiffs- u. Trop.-Hyg.* **38.** 159-170. [17 refs.] [Copied *verbatim* from *Trop. Dis. Bull.* **31.** 589. Signed by W. Y.]

Estimations of the sulphocyanate content have been made on the blood of a series of animals at various stages of trypanosomal infections.

The occurrence of sulphocyanate in the human and animal body has been recognized for a long time, and the phenomenon has been studied both in health and in disease. A summary of this work is given. Through the work of SULLIVAN and DAWSON (1921) and others we know that sulphocyanate is formed during the metabolism of proteins, and that this is due to the action of a ferment, Rhodanese. It is believed that sulphocyanate must be a regular constituent of the body.

In their own experimental work the authors used the colorimetric method first described by LOCKEMANN and ULRICH (1931) for the estimation of sulphocyanate in the gastric juice. Preliminary investigations showed the amount of sulphocyanate in the blood of normal horses and goats to vary from 0·05 to 0·5 millinormal (0·29 mgm. per cent. and 2·9 mgm. per cent.) and of calves and dogs from 0·005 mn. to 0·05 mn. (= 0·029 mgm. per cent. and 0·29 mgm. per cent.). The result of the estimation of the sulphocyanate blood content in a series of these animals infected with *T. congolense* and *T. brucei* is given in a number of tables. It was found that these infections in all the animals produced a rise in the sulphocyanate blood content. This increase is the expression of an increased destruction of protein due to the trypanosomal infection. The sulphocyanate blood content is independent of the temperature and of the intensity of the blood infection, and it is not influenced by adrenalin. It varies during the course of the infection and may fall to very low values shortly before death. Similarly it falls to normal after the animal is definitely cured, but after an incomplete cure the fall is merely transient. In such cases a subsequent rise of the sulphocyanate titre signifies a relapse of the infection even though this may not be manifest from blood examination.

PREVITERA, A. (1933). La leishmaniose viscérale canine à Catania. [**Canine K.A. in Catania**].—*Boll. Sez. ital. Soc. internaz. Microbiol.* **5.** 323-330. [Copied *verbatim* from *Trop. Dis. Bull.* **31.** 664. Signed by C. M. W.]

PULVIRENTE in 1912 found that a percentage of 1·09 of dogs examined by him in Catania were suffering from kala azar. In the same year PANTO obtained a figure of 2·42 per cent. from 165 dogs, while the author now reports having found 6 cases of infection in 100 dogs examined. He comments on the differences between these figures and passes on to the general question of the much-discussed problem of the relationship between human and canine kala azar in the Mediterranean region.

GIORDANO, A. (1933). Le chat dans la transmission de la leishmaniose viscérale de la méditérranée. [**The Cat in the Transmission of Mediterranean K. A.**]. —*Boll. Sez. ital. Soc. internaz. Microbiol.* **5.** 330-332. [12 refs.] [Copied *verbatim* from *Trop. Dis. Bull.* **31.** 664. Signed by C. M. W.]

The *post-mortem* examination for leishmania of 110 adult cats and 10 kittens in Catania, from parts of the town when human kala-azar is most common and during the months of June and July where the cases in children are most frequently encountered, has failed to reveal a single infection. Particular care was taken to select only those animals which, from their poor condition and the presence of skin lesions, might have been suspected to be infected.

I. CAMINOPETROS, J. (1934). Lésions cutanées du chien, revêtant les caractères du Bouton d'Orient. [**Skin Lesions in the Dog showing the Characteristics of Oriental Sore**].—*Bull. Soc. Path. exot.* **27.** 527-534. 5 figs. [9 refs.]

II. Giraud, P., & Ciaudo, P. (1934). Absence de transmission héréditaire des caractères sérologiques de la leishmaniose interne chez le chien. [**Absence of Hereditary Transmission of the Serological Characters of Visceral Leishmaniasis in Dogs**].—*C. R. Soc. Biol. Paris.* **116.** 483-485.

III. Nattan-Larrier, L., Nougués, S., & Grimard-Richard, L. (1934). Action de l'ultrafiltration sur certaines réactions des sérums leishmaniens. [**Effect of Ultrafiltration on Certain Reactions of Leishmania Sera**]. *Ibid.* 585-587. [1 ref.]

IV. Nattan-Larrier, L., & Grimard-Richard, L. (1934). Action de certains composés organiques d'antimoine sur les sérums leishmaniens. [**Action of Certain Organic Compounds of Antimony on Leishmania Sera**]. *Ibid.* 716-718. [1 ref.]

I. This article discusses the relationship between cutaneous leishmaniasis of the dog and *L. tropica* infection (" oriental sore ") in man and emphasizes that skin lesions in the dog are always associated with general infection. A description is given of the cutaneous lesions in dogs, as encountered in Greece, and it is recorded that, though in some cases microscopic examinations of the spleen and liver were negative, yet leishmania could always be demonstrated by cultivation or by inoculation of a spermophile.

Skin lesions were produced experimentally in a dog by inoculation with a strain of leishmania from a case of human kala azar.

II. This article records serological examination of a bitch before and after infection with leishmaniasis, and also of six pups whelped after the infection of the mother. The formol-gel reaction, the ureastibamine test and the proportion of globulin in the serum proteins were the serological manifestations of leishmania infection for which examination was made. The bitch gave negative readings before infection and positive readings after infection, whilst the pups gave negative readings except that the proportion of globulin was above normal.

III. This article records observations on the gelification and opacity produced by the action of formol on the sera of dogs infected with *L. donovani* and *L. infantum*. The production of opacity was not affected by keeping the sera on ice, but gelification was delayed. Filtering through collodion membranes slightly reduced the opacity, but prevented, or very much delayed, the gelification. It is suggested that two separate factors may be involved in the production of opacity and gelification. The flocculation of infected sera under the influence of neostibamine and formol was not affected by the filtration.

IV. This article records the testing of three organic antimony compounds for their value in serum tests in the diagnosis of leishmaniasis. Whilst two were inactive, one did give some opalescence with infected sera and the relationship of this drug with ureastibamine and neostibamine may give some clue to the chemical quality necessary for the leishmania serum-flocculation reaction.

—U. F. Richardson.

Hindle, E., & White, P. B. (1934). **A Soluble Specific Substance in Spirochaetes.** —*Proc. Roy. Soc. London. Ser. B.* **114.** 523-529. [Copied *verbatim* from *Bull. Hyg.* **9.** 565. Signed by L. W. Harrison].

Working with an easily cultivated strain of a water leptospira, *S. biflexa*, Wolbach and Binger, the authors immunized rabbits by inoculation at 5-day intervals with a rich suspension of cultures grown on a rabbit serum medium. With the anti-sera so produced fractions of the spirochaetal substance were tested, and one of them found to be highly specific. It was prepared by preliminary solution in 0·5 per cent. NaOH, extraction with industrial spirit, treatment of the

filtrate with acetic acid, refiltration and treatment of the acid-alcohol filtrate with acetone. Then by a process of differential precipitation the acetone-insoluble fraction thus obtained was freed from protein and the result was a white very soluble powder which gave no biuret reaction and is considered by the authors to be " either a carbohydrate, or at least a carbohydrate-containing substance." It reacted with anti-serum obtained as above in dilutions up to 1 in 100,000 but not with normal rabbit serum, which, on the other hand contains agglutinins for the whole organism. The specific substance failed to react with anti-sera for six other water strains of spirochaetes or with anti-sera for pathogenic strains of *S. ictero-haemorrhagiae*. Since repeated injections of the substance into normal rabbits failed to produce any precipitating antibodies, it is considered to fall into the category of haptenes.

I. Vogel, Berta. (1933). Vergleichend-morphologische Untersuchungen an Hühner- und Rekurrensspirochäten. [**Comparative Morphological Examination of the Spirochaete of the Fowl and that of Relapsing Fever**]. —*Zlb. Bakt. I.* (*Ref.*). **111.** 139.

II. Marchoux, E., & Chorine, V. (1933). Culture du spirochète des poules. Virus visible et invisible. [**Cultivation of the Avian Spirochaete. Visible and Invisible Virus**].—*Ann. Inst. Pasteur.* **51.** 477-502. 8 tables. [14 refs.]

III. Jahnel, F. (1933). Untersuchungen über das Verhalten der Pathogenität von Spirochäten auf künstlichen Nährböden, inbesondere über die willkürliche Beeinflussung der Pathogenität von Hühnerspirochätenkulturen. [**Investigations on the Retention of the Pathogenicity of Spirochaetes in Artificial Culture Media. (Fowl Spirochaetes)**].—*Zlb. Bakt. I.* (*Orig.*). **130.** 349-357. 1 fig. [19 refs.]

I. The author draws attention to the contradictory statements in text-books as to the relative size of avian spirochaetes and those of relapsing fever. On examination of living specimens by dark field illumination, using Seidentopf's condensor, *Treponema recurrentis* shows a double contour whilst the avian spirochaete appears as a simple line. The contour given by objects under similar illumination depends upon their thickness, so that *Trep. recurrentis* is thicker than *Trep. gallinarum*.

II. This paper records experiments on the cultivation of fowl spirochaetes and on the relationship between the visible and ultravisible forms of the organism. It was found that, although primary cultures could be obtained on a medium composed of coagulated egg white in inactivated rabbit serum and normal saline, to which fresh rabbit blood is added at the time of inoculation, yet subcultures were unsuccessful unless the reaction was adjusted to pH 7·2 to 7·5, and peptone added to the medium. The addition of glycogen favoured the multiplication of spirochaetes. Some measure to reduce the supply of oxygen was necessary, and this could be supplied by covering cultures with vaseline or by inoculating them with *B. eucarians*, an organism resembling *B. megatherium*. Other organisms, such as *B. subtilis*, led to excessive acidity which prevented the growth of the spirochaetes.

Cultures of spirochaetes could be obtained from infected *Argas* if the ticks were disinfected for 20 minutes with 5 per cent. phenol before opening them.

The ultravisible form of the spirochaete could be cultivated in the same way as the visible organisms and after six or seven generations the virus assumed the visible spirochaete form, after which no invisible virus remained in the cultures.

The virus form was found to be present in the blood of fowls from 18 to 20 hours after the bite of an infected tick up to the 15th day.

III. This article records investigations into the loss of pathogenicity by

old cultures of fowl spirochaetes. Experiments showed that this loss was associated with subcultivation at long intervals. Whilst cultures passaged at intervals of four days retained their virulence, those passaged at eight-day intervals rapidly lost it. The pathogenicity could be restored to old avirulent strains by subculture at short intervals or by passage through a series of fowls. The loss of virulence set in more rapidly at a higher temperature (37° to 40° C.) than it did at 33° C., and preservation on ice favoured retention of virulence. The injection of an avirulent culture gave protection against the injection of virulent blood containing the same spirochaete strain, but, since non-pathogenic cultures may be in fact saprophytic species, it is important to ascertain that their virulence can be revived.

—U. F. Richardson.

DISEASES CAUSED BY VIRUSES.

Curasson, G. (1934). Sur la durée de conservation du vaccin formolé contre la peste bovine. [**Keeping Qualities of Rinderpest Formolized Vaccine**].—*Bull. Soc. Path. exot.* **27.** 419-421. [3 refs.]

Curasson denies the allegations of some workers that his formalinized rinderpest vaccine does not keep for more than ten days. He asserts that even under tropical conditions it remains usable for at least one month. In support of this claim he refers to the very wide use of the vaccine in French African territories and gives some results of particular cases where vaccine up to two months old was used with success.—J. E.

Gerlach, F. (1933). Zur pathologischen Anatomie der Rinderpest. Rinderpest bei piroplasmosekranken Tieren. [**Pathology of Rinderpest and Piroplasmosis**].—*Wien. tierärztl. Mschr.* **20.** 785-795. 13 figs.

The author studied the pathological changes in cattle affected with rinderpest in Anatolia, either as a single infection or complicated with piroplasmosis. He describes the variations which he found in the lesions of the nasal and oral mucous membranes and of the abomasum in animals simultaneously affected with both diseases, comparing them with those of pure rinderpest. The variations were not striking, but it may be briefly said that in the mixed infection the lesions tended more towards a haemorrhagic character. "The changes in the oral mucosa in rinderpest are manifested by epithelial necroses and by croupous or diphtheroid processes and the acute catarrhal or haemorrhagic changes of the oral and nasal mucosae indicate the simultaneous presence of piroplasmosis."—J. E.

I. Ledingham, J. C. G. (1933). **The Growth Phases of Pleuropneumonia and Agalactia on Liquid and Solid Media.**—*J. Path. & Bact.* **37.** 393-410. 25 figs. on 4 plates. [23 refs.]

II. Schwetz, J., Els, & Caccavella. (1934). Notes sur une épizootie de péripneumonie contagieuse bovine dans une ferme de Stanleyville. [**Contagious Bovine Pleuro-Pneumonia on a Farm at Stanleyville**].—*Ann. Soc. belge Méd. trop.* **14.** 65-74. 1 fig., 1 table.

I. Films were made direct from centrifugalized deposits of horse-serum broth cultures and impression preparations from colonies on serum agar were also used. In both cases the slow Giemsa method was employed.

The growth phases are divided into four, as follows :- (1) the initial growth corpuscle "germinates" giving numerous deeply stained chromatic corpuscles with ramifying pinkish filaments, which contain here and there small chromatic

bodies ; (2) the terminal and endomycelial chromatic nodes in the interlacing mycelial filaments swell and finally start to divide into irregular bodies of varying sizes ; (3) in the young agar colony, the tangled threads form a granular foundation and the chromatic nodes enlarge to bodies of varying sizes, each surrounded by a pale blue-staining sheath and (4) the periphery of the colony consists of actively growing elements of various shapes concentrically arranged around their parent " nucleated " bodies. As the colony ages the chromatic thickenings condense and harden, the dimensions becoming so reduced that they can pass through candle filters ; many deficient and often bizarre forms arise, some showing definite degeneration.

These observations were made on three strains of pleuro-pneumonia from different parts of the world and no essential differences were observed.

A study of the agalactia organism showed little evidence of active proliferation at 24 hours, but otherwise its behaviour was very similar to that of pleuro-pneumonia. The fluid cultures are more granular in agalactia, and on solid media a crystalline matter, the nature of which has not yet been ascertained, is produced.

These two organisms are placed in the family *Actinomycetaceae* ; their easy filtrability is due to the absence of a rigid structure as the elements are thick protoplasmic droplets.

II. The Stanleyville area had been free of pleuro-pneumonia from 1928 to 1931. During 1931, two cases were met with in cattle imported from Anglo-Egyptian Sudan. These animals died while under treatment for trypanosomiasis.

In 1932, an outbreak of pleuro-pneumonia was diagnosed on a farm. Although the imported cattle had been quarantined and slaughtered immediately afterwards, it is assumed that this disease was brought in from the Sudan. Tail vaccination with live vaccines consisting of one part of glycerine, one part of 0·5 per cent. carbolic in water and two parts of " l'exsudat pleurétique " or " sérosité pulmonaire " was carried out. Of 127 vaccinated, 41 reacted and 34 died. The non-reactors were revaccinated and all reacted. The percentage of reactors was higher using lung serum vaccine than with pleural exudate. No calves reacted. Sixteen have since been slaughtered ; five calves which had not reacted were found affected, three beasts were found free of pleuro-pneumonia and the remainder were affected with some form or other of the disease.

[The author generalizes from this small outbreak amongst 127 cattle that pleuro-pneumonia can only be eradicated by slaughter. The slaughter policy alone was not found practicable in Bechuanaland nor in Uganda, and other methods were used successfully to eradicate the disease].—Harvey S. Purchase.

Burnet, F. M., & Galloway, I. A. (1934). **The Propagation of the Virus of Vesicular Stomatitis in the Chorio-Allantoic Membrane of the Developing Hen's Egg.**—*Brit. J. Exp. Path.* **15.** 105-113. 5 tables. [6 refs.]

Previous experiments [Galloway & Elford. (1933). *Brit. J. Exp. Path.* **14.** 400.] have indicated that the virus of vesicular stomatitis can be propagated in the chorio-allantoic membrane of developing eggs. It is now shown that both the Indiana and New Jersey strains can be cultivated in this manner. The former has been transmitted through ten serial passages and 15 have been made with the latter. A tendency of both strains to kill the embryo in from 24 to 48 hours has been noted, particularly in the case of the Indiana virus. In those instances in which the embryo was destroyed, the virus was found in abundance in the skin, liver and brain as well as in the inoculated membrane. If, however, the conditions prevented this early lethal action, the reaction of the membrane appeared to prevent the virus from infecting the embryo and, in some instances, even resulted in an autosterilization of the membrane itself.

The egg injection method was used with success for the demonstration of neutralizing antibodies in the sera of immune guinea pigs by inoculating mixtures of equal parts of serum with falling amounts of " gradocol " filtrates of virus into developing eggs. It was observed, however, that balanced mixtures which produced no lesions in the guinea pig might induce a response in the egg. This fact, in conjunction with parallel titration experiments, indicated that the egg was much more sensitive to small doses of virus than was the guinea pig. It was also possible to employ the egg to demonstrate the identity of the two different strains of the virus. In these experiments the virus was mixed with the homologous and heterologous immune sera respectively before injection.

Virus suspensions may be rendered apathogenic for the guinea pig by photodynamic inactivation by methylene blue. Such suspensions were also incapable of infecting the chorio-allantoic membrane.—R. E. Glover.

I. Spence, J. H. (1934). **Problems Confronting a Practitioner in the Application of the Immunizing Treatment against Hog Cholera.**—*J. Amer. Vet. Med. Ass.* **84.** 399-420. [1 ref.]

II. McBryde, C. N. (1934). **The Persistence of Hog Cholera Virus in the Bodies of Swine after Simultaneous Inoculation.**—*Ibid.* 420-430. [8 refs.]

III. Blain, C. (1934). Pneumo-entérite contagieuse du porc et peste porcine. Essai de vaccination. [**Contagious Pneumo-Enteritis and Swine Fever. Vaccination against Pneumo-Enteritis**].—*Bull. Soc. Sci. vét. Lyon.* **37.** 41-45. [3 refs.]

I. This is a comprehensive survey of the difficulties and pitfalls that may be encountered under field conditions in carrying out the serum-virus method of immunization against swine fever.

II. McBryde carried out a series of experiments to determine the length of time swine fever virus persists in the systems of pigs that have been subjected to the serum-virus method of immunization.

Experiments made in 1916 at Ames showed that virus persisted in the blood of serum-virus inoculated pigs for about two weeks, but was no longer present at the end of four weeks. In the experiments now reported it was found that the virus could not be demonstrated in the circulating blood three weeks after vaccination ; the virus apparently disappears from the blood about the third week after vaccination.

The virus was found in the lymphatic glands of pigs three weeks after vaccination but it could not be demonstrated six weeks after.

The excretion of virus in the urine of vaccinated pigs is rather variable ; it may or may not be present, and when present it is excreted at irregular intervals.

III. There is frequently observed, following an acute attack of swine fever, a secondary stage in which pneumonia and enteritis occur. Blain claims that, by the use of vaccine comprising bacteria belonging to the pasteurella and paratyphoid groups isolated from affected pigs, he has been able to reduce considerably the mortality caused by the secondary pneumonia and enteritis.—T. M. Doyle.

I. Henry, M. (1934). **Swine Fever and Paratyphoid in Pigs.**—*J. Comp. Path. & Therap.* **47.** 158-160.

II. —. (1934). **Code for Serum-Virus Industry.**—*J. Amer. Vet. Med. Ass.* **84.** 561-563.

I. Henry replies to a recent editorial in *J. Comp. Path. & Therap.* **46.** 257 [this *Bull.* **4.** 231.] which comments as follows on an article by Hindmarsh and Edgar [*Dept. Agric. New South Wales, Vet. Res. Rep.* No. 6] :—

" Without losing sight of any of the evidence in the article, we cannot agree that the possibility that the original disease in the abattoir pigs was swine fever was excluded."

Henry brings forward evidence from the administrative and epizootiological aspect in support of the conclusions of HINDMARSH and EDGAR. He traces the history of swine fever in Australia and pays particular attention to those outbreaks that have occurred in New South Wales. He describes the precautions taken for the early detection of the disease should it again appear.

" It is held that the pigs regarding which Hindmarsh and Edgar reported were pigs produced in a swine fever-free continent, and not from a swine fever-free farm or even area. These pigs did not come from farms on which mortalities resembling swine fever had occurred. In fact, there is no evidence that any particular mortality was occurring."

In a note on Henry's article, the editor of the *J. Comp. Path. & Therap.* points out that HINDMARSH and EDGAR suggested the need for guarding against the possibility of the disease on which they were working being swine fever, but that they failed to take the only reliable precaution – a biological test with an organic or blood filtrate.

II. This refers to a re-organization of the hog cholera [swine fever] serum and virus-producing industry, acceptable to the National Industry Recovery Administration. It aims at the stabilization of the industry as regards prices, reserves of serum, etc., and it is hoped that it will eliminate unfair competition. —T. M. DOYLE.

I. SARNOWIEC, W.. (1934). Nowa metoda rozpoznawania chorób powodowanych przez zarazki przesaczalne w zastosowaniu do diagnostyki pomoru trzody. [**New Diagnostic Methods for Virus Diseases. Use with Swine Fever**].—*Wiadom. Wet.* **13.** 65-96. 2 figs., 9 tables. [1 ref.] [Abst. from French summary].

II. SARNOWIEC, W. (1934). Nouvelle méthode de diagnostic des maladies à virus filtrants ; son application au diagnostic de la peste porcine. [**New Diagnostic Method for Virus Diseases : Application to Swine Fever**].—*Bull. Acad. vét. France.* **7.** 147-149. [1 ref.]

III. SARNOWIEC, W. (1934). Au sujet de la nouvelle méthode de diagnostic de la peste du Porc. [**New Method of Diagnosis of Swine Fever**].—*Ibid.* 201-204. [1 ref.]

I. In order to eliminate the grave objection to his original method of diagnosis for swine fever, namely, the use of live virus [this *Bull.* **4.** 346.] the author carried out further tests with an antigen consisting of an emulsion of castor oil and defibrinated blood from an acute case of swine fever, formolized at 1 : 500. His results in five piggeries confirmed the fact that infected pigs show a local, thermal and general reaction and that healthy pigs show no reaction to the intradermal application of the antigen.

II. Substantially the same as I.

III. Sarnowiec's formolized antigen was given intravenously to seven pigs suspected of swine fever ; all showed a general reaction and died within a few days of swine fever. Three other pigs that had temperatures before they were tested did not react and recovered : a negative diagnosis for swine fever is therefore given for these.

This article also contains a brief account of further intradermal tests on 14 pigs, the results agreeing with the previous ones for this test. The antigen employed was six weeks old and still retained its potency.—J. E.

I. Seifried, O., & Herbstreith, H. (1934). Zur Frage der diagnostischen Bedeutung der Lymphknotenveränderungen bei akuter Schweinepest. [**Diagnostic Value of Lymph Gland Changes in Swine Fever**]. —*Berl. tierärztl. Wschr.* **50.** 230-232. [12 refs.]

II. Nagel, H. C. (1933). Das Blutbild bei der Schweinepest in akuten und chronischen Fällen. [**Blood Picture in Acute and Chronic Swine Fever**].—*Inaug. Diss. Hanover.* pp. 77. 11 tables, 5 graphs. [62 refs.]

I. The authors tabulate three types of lymph gland changes in swine fever, those in which there is hyperaemic swelling, those with a haemorrhagic infiltration of blood in the gland parenchyma and those glands in which there is a dense infiltration of red blood corpuscles, giving the gland a dark red colour, and in which the parenchyma is unrecognizable. After a detailed account of these changes they conclude that the macroscopic appearance of the glands in swine fever can be so similar to that of congestion from any cause that, to arrive at a diagnosis, other symptoms must be looked for such as septicaemia. In doubtful cases histological examinations must be resorted to and the characteristic changes in the broken-down blood vessels will indicate swine fever.

II. This paper describes the blood picture together with the erythrocyte and leucocyte counts of healthy pigs, as well as of pigs affected with swine fever, either by natural or artificial means. The blood count is of little assistance in chronic cases, but in acute swine fever there is some evidence of anaemia and also a disintegration of leucocytes occurring within 48 hours of infection and before the onset of clinical symptoms.—D. J. Anthony.

I. —. (1934). **Discussion on Louping-Ill.**—*Proc. Roy. Soc. Med. London.* **27.** 701-712. [35 refs.]

II. Gordon, W. S. (1934). **Comparative Aspects of Louping-Ill in Sheep and Poliomyelitis of Man.**—*Brit. Med. J.* May 19th. 885-888. [28 refs.]

III. Rivers, T. M., & Schwentker, F. F. (1934). **Louping Ill in Man.**—*J. Exp. Med.* **59.** 669-685. 3 tables, 3 charts. [10 refs.]

IV. —. (1934). **Louping-Ill in Man.**—*Brit. Med. J.* Aug. 11th. 261. [3 refs.]

I. This discussion on "louping ill" was opened by Gordon. Having reviewed the modern conceptions of the aetiology of this disease, Gordon directed attention to certain comparisons between "louping ill" and poliomyelitis in man. He pointed out the similarity in the period of incubation, the diphasic temperature reaction and the possibility of detecting the virus in the blood stream, especially in the early stages. One attack of "louping ill" confers a solid immunity, but it should be noted that many sheep exposed to infection acquire an immunity without showing symptoms of the disease. It may be inferred that the low incidence of epidemic poliomyelitis results from the existence of a subclinical form of the disease. In both conditions active immunity is difficult to induce; moreover the essential pathological changes in both conditions are remarkably similar. The seasonal incidence of the two diseases is discussed and it is pointed out that enzootic "louping ill" is mainly confined to lambs and yearlings while poliomyelitis is most prevalent in young children up to five years of age.

Pool said that much was to be learned as to the conditions determining the presence or absence of infection on farms, and pointed out that clean and affected areas were often in very close proximity. With regard to artificial infection he noted that, on account of numerous earlier failures with sheep, pigs were first infected with the virus: subsequently sheep were infected from the pig and were used exclusively for the main experiments. He suggested that the lack of success of previous workers might have been due to failure to investigate systematically all potentially

infective tissues, or to the use of an insufficient number of test animals. He had been unable to obtain evidence of human infection in affected areas and suggested that passage through the mouse might modify the virus in this respect.

Galloway described experiments on the filtration of the virus through graded collodion membranes to determine the size of the particles and the effects of buffered solutions [Elford & Galloway. (1933). *J. Path. & Bact.* **37.** 381]. He said that a number of human, monkey and sheep sera had been examined, with results which suggested that infection with " louping ill " virus was accompanied by the development of neutralizing antibodies. Sera from recovered cases of poliomyelitis failed to neutralize " louping ill " virus.

II. Similar to above.

III. An account of four cases of " louping ill " in man, the main feature being an encephalitis. Unfortunately, it was not possible to demonstrate the virus in the blood, but the identity of the disease was suggested by the existence of neutralizing antibodies for " louping ill " virus (mouse strain) in the sera after recovery.

IV. A review of " louping ill " in man with special reference to III.

—R. E. Glover.

Cariati, M. (1934). Sulla profilassi specifica del cimurro del cane. [**Specific Prevention of Dog Distemper**].—*Profilassi.* **7.** 51-52. [English and French summaries : abst. from English summary.]

The author reports good results with Puntoni's immunization method against dog distemper. Vaccine is prepared from the brains of dogs dying of acute distemper involving the nervous system.—J. E.

Howitt, Beatrice F. (1933). **Poliomyelitis. IV. Further Studies on the Immunization of Sheep to the Virus of Poliomyelitis, with a Comparison of Neutralization Tests, using the Old and a Recent Strain of Virus.**—*J. Infect. Dis.* **53.** 145-156. 5 tables. [13 refs.]

Serum capable of neutralizing poliomyelitis virus was produced in a refractory animal, the sheep, by means of bi-weekly subcutaneous and intramuscular injections of a monkey-adapted strain of virus over a period of five months. This serum was capable of neutralizing the monkey passage virus at an end dilution of 1 : 200, but failed at a similar dilution to neutralize a freshly isolated strain of virus. Convalescent human serum was always capable of neutralizing the freshly isolated strain of virus, but failed in some cases to neutralize the monkey passage virus.

This change in the virus as a result of its adaptation to an experimental animal is comparable to that recorded for the viruses of rabies, vaccinia and herpes and the author comments on the advisability of employing a recently isolated strain of virus, both for work on immunization and for testing the anti-viral power of immune serum.

[" Louping ill " virus which naturally affects sheep presents certain characteristics closely allied to poliomyelitis virus].—W. S. Gordon.

I. Nicolau, S., & Kopciowska, L. (1934). Sur la transformation du virus rabique fixe en virus des rues. [**The Transformation of Fixed into Street Rabies Virus**].—*C. R. Acad. Sci. Paris.* **198.** 622-624. [5 refs.]

II. —. (1934). Enquête sur la rage. [**Enquiry into Rabies : Replies from Germany, Lithuania, Czechoslovakia and Yugoslavia for 1933**].—*Bull. Off. internat. Epiz.* **8.** 435-440. 4 tables, 1 graph.

I. The authors have reported that repeated passage of fixed virus from nerve

to nerve in the rabbit over a period of a year resulted in a mutation to a virus having the characteristics of street rabies. Originally the strain was incapable of inducing the formation of Negri bodies, but it gradually acquired this property.

II. Reports from Germany show a slight diminution in the incidence of rabies. It is especially noteworthy that outbreaks were mainly confined to the Eastern frontiers. Tables are given showing the numbers of outbreaks reported in Lithuania, Czechoslovakia and Yugoslavia respectively.—R. E. Glover.

I. Remlinger, P., & Bailly, J. (1933). La paralysie bulbaire infectieuse (maladie d'Aujeszky). Maladie d'étude et de démonstration. [**Aujeszky's Disease (Infectious Bulbar Paralysis, Pseudorabies, Mad Itch)**]. *Biol. méd.* **23.** 433-454. 9 figs. on 1 plate. [16 refs.]

II. Remlinger, P., & Bailly, J. (1934). Contribution à l'étude du virus de la "maladie d'Aujeszky." [**A Study of the Virus of Aujeszky's Disease**].—*Ann. Inst. Pasteur.* **52.** 361-405. [7 refs.]

III. Jonnesco, D. (1934). Recherches sur la maladie d'Aujeszky. [**Investigation into Aujeszky's Disease**].—*C. R. Soc. Biol. Paris.* **116.** 1184-1186.

I. A general description of Aujeszky's disease [infectious bulbar paralysis, pseudorabies, mad itch] with special reference to the nature of the virus, species susceptible, methods of transmitting the virus together with the sites of its localization and the histological changes in the tissues of infected animals. [The authors have previously dealt with the different aspects of the disease mentioned above in a series of short notes which have been abstracted in this *Bull.* **3.** 699, **4.** 165, 234, 468 and 572]. The article concludes with a table showing the main points of difference between rabies and Aujeszky's disease.

II. Similar to I, but in a more extended form.

III. A strain of the virus of Aujeszky's disease was isolated from the brain of a dog suspected of rabies. A description is given of the species of animals which were susceptible, together with the haematological and histopathological findings.—R. E. Glover.

Curasson, G. (1934). La "fièvre de la Vallée du Rift" existe-t-elle au Soudan français? [**Does Rift Valley Fever exist in the French Sudan?**].—*Bull. Soc. Path. exot.* **27.** 599-602. [2 refs.]

Stefanopoulo observed a human disease of the Ségou and Macina districts of the French Sudan and Curasson has observed a disease of sheep in the same districts. Both of these diseases have a syndrome similar to that of Rift Valley fever.

He considers that a collective investigation should be carried out in order to ascertain whether these diseases are identical.—J. E.

Schepel, J. A. C. (1934). Koepokkeninfectie bij den mensch. [**Cowpox Infection in Man**].—*Ned. Tijdschr. Geneesk.* **78.** 1855-1859. [English summary]. [Copied *verbatim* from *Bull. Hyg.* **9.** 533-534. Signed by W. F. Harvey].

The importance of recognition of this affection is obviously greatly increased by the abolition of compulsory vaccination before school-attendance age. Cowpox appears to be comparatively common in Friesland, judging by the author's description of two epidemics and of other similar ones. In one of these a farm hand was admitted to hospital with a lesion on the 4th finger, a phlegmonous arm and a mass of glands in the axilla. An ulcer with black necrotic centre was situated near the nail and was surrounded by a violet-red zone extending over the back of the finger. The man was evidently ill and his temperature rose to 40°C. (104°F.).

His condition improved under fomentation ; the black necrotic centre of the ulcer became detached ; his temperature fell to normal after 10 days and no formation of pus occurred either at the nail bed or along the lymphatic vessels. This man was a milker and his employer, a farmer, had 35 sick cows, 3 sick men and a sick maid. Vesicles had developed on the nipples of the cows, which rapidly dried up to form crusts. Another epidemic was present at the same time on a farm 3 km. distant, where there were 50 sick cows and the farmer and some of his assistants had also paronychia and pustules. .

The differential diagnosis from cowpox of streptococcal and staphylococcal conditions, foot-and-mouth disease and the so-called " milker's knots " is considered. Prophylaxis for human beings is obviously an immediate vaccination of all the personnel, but that for the cow is somewhat more complicated. So far as conveyance of the disease from the hands of the milker goes it is a matter of segregation of the first animals affected. But where does the original infection arised A number of conditions is reviewed and the suggestion is thrown out that " grease " in horses, variola, vaccinia, natural cowpox, stomatitis equi, bird pox and bir ? diphtheria may be all simply variants of one and the same virus infection.

I. Csontos, J., & Nyiredy, I. (1933). Vizsgálatok a malacok himloszeru börkiütésének okáról. [**Aetiology of Pox-Like Skin Eruptions of Piglets**].— *Allatorv. Lapok.* **56.** 23-26. 6 figs. [A German translation appears in *Deuts. tierärztl. Wschr.* **41.** 529-532]. [Abst. from latter].

II. Herrmann, O., & Chlusszow, K. (1933). Eine Ferkelkrankheit mit pockenähnlichem Ausschlag. [**A Disease of Piglets with Pox-Like Eruptions**]. – *Berl. tierärztl. Wschr.* **49.** 808-810. [6 refs.]

I. The authors describe a widespread disease of young pigs in Hungary. It bears a resemblance to swine pox and is characterized by the formation of circular weals which break leaving a crust which eventually drops off.

One sow and her litter were examined and it was noticed that they were badly infested with lice ; therefore, in order to find out whether the latter were actively associated with the conditions, a filtered extract of some lice was prepared and injected into the skin of some test pigs and some live lice were placed for a day on the skin of healthy pigs. In both cases the typical skin lesion developed. Further research on the factors influencing individual susceptibility is, however, necessary.

II. A severe disease broke out on a large pig farm in Armenia. Piglets two to three weeks old were affected and nearly 500 pigs died after an illness lasting from four to 12 days. A severe exanthema followed an initial diarrhoea, vomition sometimes occurred but there were no respiratory symptoms. A committee of veterinary specialists in different fields advanced the theory that the disease was an atypical swine pox : swine pox has not previously been observed in Transcaucasia.

Research work was undertaken on healthy pigs, rabbits and guinea pigs and the results ruled out pox as the disease in question. The authors suggest that the disease is due to pasteurella infection superimposed upon louse bites. No further work along these lines was, however, carried out.—J. E.

Kraneveld, F. C., & Djaenoedin, R. (1934). Over de biologie van het virus der peristomatitis bij schaap en geit. [**Biology of the Virus of Peristomatitis in Sheep and Goats**].—*Ned.-Indisch. Blad. Diergeneesk.* **46.** 13-18. 2 tables. [1 ref.] [English and German summaries : abst. from orig.]

The authors studied the resistance of the virus of peristomatitis in crusts taken from sheep and goats to the influence of direct sunlight. It was still alive

after an exposure of 42 hours at a temperature of 43° to 48° C. Further investigations were made in order to ascertain how long the virus in crusty material survived in glycerine. The virus soon appeared to lose its virulence and was dead after 60 days. The air-dried material, however, remained virulent for a long time, when stored in the dark at room temperature (27° to 30° C.). It could be kept in this state for 11 months, and after 12 months it could still cause a slight infection. —J. VAN DER HOEDEN (UTRECHT).

BLANC, G., & MARTIN, L. A. (1933). Sensibilité du lapin et de l'homme au virus de la stomatite des ovins. [**Receptivity of the Rabbit and Man to the Virus of Ovine Stomatitis**].—*C. R. Acad. Sci. Paris.* **197.** 586-587. [5 refs.]

A suspension of fresh sheep stomatitis virus induced a papulo-scabby eruption on the skin of the rabbit. The crusts from this animal were passaged to sheep and to three human subjects with positive results.—R. E. GLOVER.

I. NEWSOM, I. E., & CROSS, F. (1934). **Sore Mouth in Feeder Lambs due to a Filtrable Virus.**—*J. Amer. Vet. Med. Ass.* **84.** 231-247. 3 figs., 2 tables. [8 refs.]

II. NEWSOM, I. E., & CROSS, F. (1934). **Sore Mouth in Sheep Transmissible to Man.**—*Ibid.* 799-802. 2 figs. [2 refs.]

III. MANLEY, F. H. (1934). **Observations on the Virus of Contagious Pustular Dermatitis.**—*Vet. J.* **90.** 80-91. [10 refs.]

IV. BLANC, G., & MARTIN, L. A. (1934). Les réactions d'immunité du Lapin au virus de la stomatite des Ovins. [**Immunity in the Rabbit to the Virus of Ovine Stomatitis**].—*C. R. Soc. Biol. Paris.* **115.** 1055-1057.

V. BLANC, G., & MARTIN, L. A. (1934). Présence du virus de la stomatite des Ovins dans le cerveau du Mouton. Encéphalite expérimentale du Lapin. [**Existence of the Virus of Stomatitis in the Brain of the Sheep. Experimental Encephalitis in the Rabbit**].—*Ibid.* 1057-1058. [4 refs.]

I. Scabs from six outbreaks of sore mouth in sheep, when tested on the scarified thighs of experimental animals, gave rise to typical vesico-pustular responses. The dried scabs retained their infectivity for more than a year. The virus was filtrable through Berkefeld V candles with some loss in infectivity, but was completely retained by Mandler normal candles.

II. Three workers who had been handling sheep affected with sore mouth developed vesicular eruptions. Material from these lesions set up typical reactions in experimental sheep.

III. Various strains of desiccated virus of English, Australian and Cyprian origin were tested on sheep. The ovine strains were potent up to a dilution of 1 : 100,000, but the caprine strains reacted up to 1 : 1,000 only. Sheep vaccinated by scarification of the thigh were protected against reinfection, but the immunity was not absolute ; the serum from recovered or hyperimmunized lambs was capable of inhibiting the virus.

The author has confirmed the viability of the virus in dried scabs stored at room temperature (for eight months) and has also shown that it is rapidly destroyed by 50 per cent. glycerine. Crusts exposed to external conditions lost their infectivity fairly rapidly. The scabs were rendered non-virulent in two hours by carbolic acid (1 : 100), formalin (1 : 2,000) and mercuric chloride (1 : 20,000), but not by potassium permanganate (1 : 20,000). The virus passed through Berkefeld V candles with some reduction in potency.

Flocculation and complement-fixation tests were incapable of demonstrating the specificity of suspected scabs. With reference to the relationship of goat pox

to dermatitis, cross-immunity experiments showed that goats recovered from severe natural goat pox were susceptible to the virus of dermatitis.

IV. The inoculation of rabbits with the virus of sheep dermatitis induced a mild papular reaction. After recovery, a localized immunity confined to the site of inoculation was produced, but there was no protection of other parts of the skin.

V. The transmission of the virus of dermatitis to the brain of the sheep and of the rabbit is reported.—R. E. Glover.

I. Bice, C. M. (1933). **Fowl Pox (Sorehead) Control by Vaccination.**—*Hawaii Agric. Expt. Sta. Circ.* No. 8. pp. 13. 5 figs. [5 refs.]

II. Lahaye, J., & de Saint Moulin, L. (1934). Formes spéciales de l'affection diphtéro-variolique du pigeon. [**Atypical Forms of Pigeon Pox**].—*Ann. Méd. vét.* **79.** 11-18. 6 tables. [1 ref.]

III. Coronel, A. B. (1934). **Fowl-Pox Vaccine from Virus of Turkey Origin.**—*Philippine J. Anim. Indust.* **1.** 85-90. [8 refs.]

I. Bice states that there is a high incidence of fowl pox in Hawaii and that it is the cause of a heavy annual loss. He reports the results obtained in the field from the vaccination of fowls with virulent fowl pox vaccine applied by the " stick " method to the webbed portion of the wing.

The vaccine was not suitable for the inoculation of adult fowls. Vaccination of chicks four to eight weeks old gave good results, but there was a mortality of 2 to 3 per cent. Vaccination of chicks less than four weeks of age resulted in a high mortality.

II. The authors point out that in the common sites the recognition of pox lesions in pigeons is easy, but that in some unusual sites it may escape detection. They describe the isolation of the virus from the crystalline lens, the web of the foot and from the semi-circular canal of pigeons.

III. Coronel tested the value of a fowl pox vaccine prepared from a virus of turkey origin. The virus when first collected was virulent for chickens, but after two months storage at 0° to 5°C. it was sufficiently attenuated not to cause generalization of infection and at the same time it conferred a good immunity.

The vaccine was prepared by suspending 11 mg. of powdered crusts in 2 c.c. of distilled water. It was applied to the comb by making a single vertical and longitudinal scarification with a knife dipped in the vaccine.—T. M. Doyle.

I. Bierbaum, K., & Kayser, W. (1933). Immunitätsprüfungen an Tauben nach experimenteller Infektion mit Taubenpockenvirus. [**Immunity Tests in Pigeon Pox**].—*Tierärztl. Rdsch.* **39.** 814. [2 refs.]

II. Baumann, R., & Weissmann, L. (1934). Untersuchungen über die Vogelpockenkörperchen. [**Investigations on Inclusion Bodies in Fowl Pox**].—*Arch. wiss. prakt. Tierhlk.* **67.** 281-289. 1 fig. [34 refs.]

III. Fröhlich, E. (1934). Zur Histologie der Geflügelpocke und Geflügeldiphtherie. [**Histology of Fowl Pox**].—*Ibid.* 322-334. 5 figs. [43 refs.]

I. Two strains of pigeon pox were shown by means of cross-immunity tests to be identical, and no indication of plurality of pigeon pox virus could be found. Difficulty was encountered in obtaining pigeons for experimental purposes, which had not previously been infected with the virus.

II. Ten pigeons were infected artificially with fowl pox. They were then killed and examined after intervals varying from four to 22 days. Paraffin sections of tissues were stained with haematoxylin and eosin [Lentz and Mann], methyl green pyronin solution [Unna-Pappenheim], and Biondi-Ehrlich-Heidenhain mixture. Giemsa stain following fixation in Carnoy's mixture also proved to be a useful procedure.

It is concluded that the acidophile cell inclusion bodies cannot be considered as true constituents of the cell associated with some degenerative process. This conclusion is based upon the fact that in the deeper epithelial layers where inclusion bodies are smallest, having only just been formed, it was not possible to demonstrate amitotic nuclear division or any degenerative process likely to produce residual bodies, which could develop into fowl pox cell inclusion bodies. These bodies are probably encapsulated virus colonies.

III. As a result of the examination of 21 fowls, artificially infected with fowl pox, EBERBECK's descriptions of the histological changes associated with this disease are confirmed. The papular stage is reached after incubation for about four days. Small vesicles are formed, situated superficially in the epithelium and having a homogenous content. The subepithelial tissue shows inflammatory changes and the capillaries are congested. Inclusion bodies are to be found in the epithelial cells. The vesicular stage is reached after seven to 14 days, by which time the vesicles have developed into pustules. Epithelial cells undergo degeneration, swelling up and becoming vacuolated; adjacent vacuoles become confluent, forming vesicles lined by the remains of intercellular septa and degenerated inclusion bodies and cell nuclei. Such vesicles are characteristic of fowl pox. The stage of healing consists in the throwing off of detritus and the regeneration of epithelial tissue.

Infection of mucous membranes with fowl pox virus produces a histological condition identical with that of a skin infection, though the histopathological picture is frequently cloaked by the outcome of secondary invasion of the lesions. Infection of the mucous membrane is frequently called fowl diphtheria; the condition is, however, true fowl pox.—E. J. PULLINGER.

I. PLOTZ, H. (1933). La courbe d'évolution d'une culture de virus de la peste aviaire. [**Growth Curve of Fowl Plague Virus in Tissue Culture**].—*C. R. Acad. Sci. Paris.* **196.** 1545-1546. 1 chart. [3 refs.]

II. PLOTZ, H. (1933). Rôle des cellules embryonnaires dans la culture du virus de la peste aviaire. [**The Influence of Embryonic Cells on the Growth of Fowl Plague Virus**].—*Ibid.* **197.** 536-537. [2 refs.]

III. KONDO, S., & NAKAMURA, N. (1934). Sur les vaccins contre la peste aviaire. [**Vaccines against Fowl Plague**].—*Bull. Off. internat. Epiz.* **8.** 430-434.

I. A series of flasks was inoculated with culture virus [this *Bull.* **3.** 248]. Daily estimations of the amount of virus showed that there was a rapid multiplication up to the 48th hour followed by a steady decline. Infectivity was lost by the ninth day.

II. Previous work has suggested that embryonic cells act as regulators of the oxygen-reduction potential. This hypothesis is confirmed by adding to flasks of culture virus certain hydrogen donators (various sulphonates of indigo) and incubating at 37°C. *in vacuo*. Under these conditions, the virus is conserved for at least three days.

III. Attempts were made to attenuate the virus of fowl plague by means of a large number of chemical agents. It was found that the efficacy of most reagents depended upon the organ which was selected. Thus virulent brain was useless as an immunizing agent when treated with chloroform or saponin, but was of value when acted upon by formalin or glycocholic acid. On the other hand, spleen treated with glycocholic acid was impotent, but was not attenuated to the same degree by formalin, ether or chloroform. Killed emulsions gave no protection.
—R. E. GLOVER.

Nieschulz, O., & Bos, A. (1934). Weitere Untersuchungen über die Infektion von Mäusen mit Hühnerpestvirus. [**Further Experiments on the Infection of Mice with Fowl Plague Virus**].—*Zlb. Bakt. I. (Orig.).* **131.** 1-6. 2 tables. [5 refs.]

The virus of fowl plague was passaged through mice for 100 generations during eight months. Mice were inoculated intracerebrally with a 1 : 10,000 dilution of infected brain suspension. A mortality of 100 per cent. was obtained, death following two to three days after inoculation. With intraperitoneal or subcutaneous inoculation similar results were obtained, the incubation period being slightly prolonged. One hundred passages through mice did not lower the virulence of the virus for fowls.—E. J. Pullinger.

I. Meyer, K. F., & Eddie, B. (1934). Ueber Papageienpest. Auf Grund von epidemiologischen und experimentellen Studien in Kalifornien. [**Psittacosis. Epidemiological and Experimental Study in California**].—*Klin. Wschr.* **13.** 865-870.

II. Meyer, K. F., & Eddie, B. (1934). **Latent Psittacosis and Salmonella psittacosis Infection in South American Parrotlets and Conures.**—*Science.* **79.** 546-548. 1 table. [3 refs.]

III. Meyer, K. F., & Eddie, B. (1934). **Psittacosis in Native Australian Budgerigars.**—*Proc. Soc. Exp. Biol. & Med. New York.* **31.** 2 tables. 917-920.

I. The large number of cases of psittacosis amongst human beings, contracted from tropical birds, particularly during the epidemic of 1929 to 1930, makes the control of such birds absolutely necessary. The shell parakeet (*Melopsittacus undulatus*) is probably the most important carrier of this infection. [An article by the above authors was abstracted in this *Bull.* **4.** 357. In both the title and the text the word " parakeet " should have been used instead of " parrot "].

Examinations of some hundreds of parakeets and of the sputum and tissues of infected human beings have shown the aetiological agent to be a filter-passing virus. Most animal experiments have been performed on mice and it is essential that they be free from salmonella infection. Intraperitoneal inoculation is followed by infection in one to 21 days accompanied by recognizable symptoms and lesions. The virus survives storage in 50 per cent. glycerine at 2° to 4°C. for 60 days. Infected spleen emulsion may resist a temperature of 55°C. for 30 minutes. A list is given of birds which have proved susceptible to infection. This list includes the common hen. Variations in the virulence of virus strains, the morphology of the virus and the clinical picture of the disease in human beings is discussed.

In parakeets and other birds the disease produces no characteristic symptoms. Similarly, the disease cannot be diagnosed from the *post-mortem* lesions. Diagnosis rests upon negative bacterial findings, subinoculation of filtered material and production of the disease in mice, and the demonstration of Levine-Cole-Lille elementary bodies. From 10 to 90 per cent. of parakeets in the United States are latent carriers of the disease. Splenic enlargement is evidence in favour of a bird being a carrier.

The article concludes with a set of regulations designed to control importers, breeders, sellers and buyers of tropical birds.

II. Amongst 39 Tovi parakeets (*Brotogerius jugularis*) and 29 conures (*Eupsittula canicularis*) no case of latent psittacosis could be demonstrated, though nine were carriers of *Bact. aertrycke*. Out of 37 spectacled parrotlets (*Psittacula conspicillata*), two were carriers of psittacosis; of 16 Spengel parrotlets (*Psittacula spengeli*) four, and of 11 brown-throated parrakeets (*Eupsittula pertinax aeruginosus*) two, carried this infection. Carriers of *Bact. aertrycke* were also found.

III. Shell parrakeets were imported from Australia under conditions of strict quarantine. Subsequently psittacosis infection was demonstrated in ten of these birds. Furthermore, healthy birds, when subjected to the Californian strain of infection, showed a high degree of resistance and recovery rate. The foregoing is considered to be strong evidence suggestive of the existence of psittacosis as an endemic disease of the native Australian parakeet. The latent form of psittacosis caused by the Australian virus does not appear to produce splenic enlargement, as is the case with infection by Californian strains.—E. J. Pullinger.

Combiesco, D. (1934). Réaction de Weil-Félix chez les chiens de Constantza. [**Weil-Felix Reaction in Dogs at Constantza**].—*C. R. Soc. Biol. Paris.* **115.** 672-673. [Copied *verbatim* from *Trop. Dis. Bull.* **31.** 625-626. Signed by D. H.]

Constantza is at present the only place in Rumania where boutonneuse fever is met with, 34 cases in 1931, 3 or 4 in 1933. Many infected ticks were found in various parts of the town in 1932 but only one human case; the author considers that the virulence of the disease may be lowered by the immunity of the local dogs on which these ticks feed.

The serum of 43 dogs was tested; a strain of OX19 was employed; 19 of the sera gave a positive reaction, 1/50 or more, the highest titre being 1/500. Of the sera of 30 dogs in Bucharest where no cases of the fever have occurred none gave a positive reaction.

Findlay, G. M. (1934). **The Infectivity of Neurotropic Yellow Fever Virus for Animals.** *J. Path. & Bact.* **38.** 1-6. 4 figs. on 1 plate. [13 refs.] [Copied *verbatim* from *Trop. Dis. Bull.* **31.** 498-499. Signed by E. H.]

With the object of obtaining larger supplies of neurotropic virus, the author has determined the reaction of a number of animals to intracerebral inoculation with two strains of yellow fever.

The cat, ferret, rabbit, rat, golden hamster (*Cricetus auratus*), wood vole (*Apodemus sylvaticus*), bank vole (*Evotomys glareolus*), pigeon, hen and canary showed no signs of disease. The virus was found to survive for a few days in those animals examined, up to 6 days in the case of the rat, but there was no evidence of any multiplication, nor any histological changes in the brain. The sera of the cat, ferret, rabbit, rat, pigeon and hen were tested by the mouse protection test before inoculation and three weeks afterwards. All were found to have acquired protective antibodies against yellow fever virus.

Guineapigs, red squirrels (*Sciurus vulgaris*) and field voles (*Microtus agrestis*) developed clinical symptoms of fatal encephalitis, 17 passages being made in guineapigs and 5 in field voles. Histologically the brains of these voles showed meningeal infiltration together with scattered areas of perivascular infiltration and here and there degenerative changes in the ganglion cells, but these changes were never so extensive as in mice. Similar histological changes were also present in the infected squirrels.

Eagles, G. H. (1933). **The *in vitro* Cultivation of Filterable Viruses.**—*Biol. Rev.* **8.** 335-344. [50 refs.]

A useful critical summary of the knowledge to date on the cultivation of viruses in symbiosis with living tissues. The views in favour of the living concept of the viruses are discussed. The experiments on their particulate nature are noted, e.g. ultra-violet light microphotography, appropriate staining reactions, high speed centrifugation and filtration through collodion membranes. The

significance of inclusion bodies is considered and the view is expressed that modern opinion tends to regard them as collections of elementary bodies within the cell and not as the products of cell activity.

The various methods of cultivating vaccinia virus in tissue cultures are discussed in detail while the literature dealing with the propagation of other viruses is briefly reviewed. In the final section the rationale of virus cultivation is surveyed with special reference to oxygen requirements, pH reactions and the feasibility of growth in cell-free media. The significance of elementary bodies in tissue cultures is noted and it is pointed out that if the inclusion bodies that are typical of certain virus diseases are an essential phase in multiplication, it is impossible for these viruses to grow in any medium devoid of cells.—R. E. Glover.

Coles, A. C. (1933). **An Easy Method of Demonstrating Some of the Virus Bodies.**—*Lancet.* **224.** 248-249.

For the demonstration of the elementary virus bodies the author recommends mixing a drop of the material containing the virus and a drop of India ink and spreading in a thin film on a slide. The preparation can then be examined under a high power of the microscope, either by ordinary or dark ground illumination. As an alternative method, Coles recommends the examination under dark ground illumination of air-dried, unfixed and unstained smears on a cover glass or slide.
—T. M. Doyle.

d'Herelle, F., & Rakieten, T. L. (1934). **Mutations as Governing Bacterial Characters and Serologic Reactions.**—*J. Infect. Dis.* **54.** 313-338. 13 tables. [13 refs.]

A strain of *Salmonella* [*Bact.*] *enteritidis* which, as far as could be ascertained, was entirely free from bacteriophage, was acted upon by a *Bact. typhosum* phage. A large number of mutants was obtained of which ten were subjected to an extensive study. It was found that all these daughter cultures continued to be phage carriers even after 40 months, but each phage acquired its own characteristics and all became definitely attenuated. At the same time, these mutants, which at first were entirely resistant, became progressively more sensitive to the original phage. They were also very different from the original strain as regards virulence, cross-agglutination, etc. : in fact, the parent culture and the ten mutants behaved as a group, comparable to the whole salmonella genus. It is suggested that all species of salmonella (even including the allied genera *Eberthella*, *Escherichia* and *Shigella*) have a common ancestor from which they originated under the stimulus of bacteriophage.—R. E. Glover.

DISEASES CAUSED BY METAZOAN PARASITES.

I. Zunker. (1933). Biologie und Bekämpfung der Dasselfliege. [**Biology and Control of the Warble Fly**].—*Zlb. Bakt. I.* (*Ref.*). **112.** 286-288.

II. Haschen, E. (1933). Versuche zur Bekämpfung des Dasselbefalls beim Rinde. VI. Beitrag. Hexaliquid, Pyrethron, Sulfoliquid, Dasselfluid nach Dr. Herbig, Medol, Petroleum + Paraffinöl aa, Warble-Oil, Cerofob-Salbe, Injektion von Dasselsalbe Gattinger, Dasselsalbe Bengen, Larfug-salbe und Vaseline in die Beulen. [**Campaign against Ox Warble Flies. VI. Trials with Several Chemical Preparations**].—*Inaug. Diss. Hanover.* pp. 35. 14 tables. [14 refs.]

III. Remien, A. (1933). Versuche zur Bekämpfung des Dasselbefalls beim Rinde. VII. Beitrag. Derrispräparate. [**Campaign against Ox Warble Flies. VII. Derris Preparations**]. *Inaug. Diss. Hanover*. pp. 47. 13 tables. [13 refs.]

I. The incidence of the warble fly in Germany is shown by a map. The life history of the warble fly is given, with a description of five stages of larvae and their behaviour and predilection sites.

Fully developed warble flies do not travel far and therefore control measures in a localized area can lead to a high degree of eradication. This was shown in practice by Prof. Spann, who obtained a 90 per cent. reduction in three years in one district. It is very important to treat cattle " carriers " of ox warble flies before they are turned out to pasture.

Treatment with derris root is discussed : it is at least 75 per cent. effective if a well-prepared powder and an efficient method of application are used : this refers to the collective treatment of herds, using a brush to apply the derris wash.

II. This is the sixth of a series on warble flies and larvicides carried out at the request of the German Ministry of Nutrition and Agriculture. The preparations mentioned in the title are for the most part proprietary ; their constituent parts are given.

In general these preparations did not prove to be effective enough for universal use. They were tested both on larvae removed from the host and on mature larvae *in situ*.

III. This paper is the seventh of the series referred to above. The author describes numerous experiments with various derris preparations, applied at different times in the spring and in one or two doses. Some 400 badly infested cattle were used. The author found that the constitution of the derris used is of paramount importance. Derris root powder containing 8 per cent. rotenone and 16 per cent. " residual extract " is highly effective in killing mature larvae. In his experience a single application late in April was about 98 per cent. effective and a double application (on successive days) was 100 per cent. effective.

It was shown that rotenone alone was of less value than the whole derris root : 2 kg. of good derris root powder makes enough wash to treat 180 animals by application with a brush over the back.—J. E.

I. Peter. (1934). Beitrag zur experimentellen Erzeugung anaphylaktischer Zustände bei Rindern mit dem Gewebssaft von Hypodermenlarven. [**Experimental Production of Anaphylaxis in Cattle with Extract of** *Hypoderma* **Larvae**].—*Berl. tierärztl. Wschr.* **50.** 241-243. 1 table. [6 refs.]

II. Zunker, M. (1934). Die Abtötung von Dassellarven mit Derris-Extrakten. [**Killing of** *Hypoderma* **Larvae by Derris**].—*Ibid.* 243-246. 1 fig., 3 tables. [12 refs.]

III. Götze, R. (1934). Verluste und Erkrankungen bei der Abdasselung durch Dassel anaphylaxie. [**Losses by Anaphylaxis in Warble Fly Control**].—*Deuts. tierärztl. Wschr.* **42.** 258-260. [7 refs.]

I. It has been noticed that symptoms of local and general bodily disturbance follow the rupture of *Hypoderma* larvae in their subcutaneous location on the back of the host. Peter prepared an extract from the bodies of full-grown larvae and tested its action on 19 head of cattle, some of which showed evidence of having been previously infested by *Hypoderma*. The larval extract was for the most part applied to the conjunctiva and in every case a reaction of an anaphylactic nature followed [see III below], clearing up in a few hours to two days.

II. Zunker discusses derris from the pharmacological angle, describing the

methods of assay of the widely differing samples of derris root on the market. He also describes a few comparative larvicidal tests with different recipes of derris root powder used for the preparation of " washes " for cattle [see also REMIEN – above].

III. Götze describes the clinical appearance of warble anaphylaxis in cattle : it only occurs in animals over three or four years old. It is thought to occur in individuals infested in two successive years and that the actual attack is due to the death of warble larvae either naturally or after treatment with derris. In the latter case it usually appears between the second and fourth days after treatment [the apparent delay presumably depending upon the time after treatment when the larvae actually die]. In addition to local swelling there may be oedema in various parts of the body including the glottis, disordered respiration, pulse and temperature, and general loss of health. Death sometimes occurs from suffocation.

He believes that the urticarial condition commonly seen in cattle in spring is the sign of natural warble anaphylaxis.

Diagnosis of this anaphylactic condition cannot be definitely made and the only method of treatment open is the symptomatic one ; particular reference is made to heart stimulants and calcium therapy.

The theory that this suspected anaphylaxis may be due to poisoning by derris is categorically disproved, toxicological tests having also been carried out with negative results in Götze's clinic. It is believed that warble anaphylaxis takes a long time to develop (about one year under natural conditions) as the experimental inoculation of warble larval extract repeated within two months caused no anaphylaxis.

As a practical measure to prevent anaphylaxis in older cattle, Götze recommends that they should not be treated at all and that, instead, treatment with derris should be continued with greater intensity in the young stock, in the hope that the general incidence of infestation would fall so much that re-infestation of the older animals would become proportionally less likely.

[HADWEN, in 1917 – *J. Amer. Vet. Med. Ass.* **51.** 13 – observed anaphylaxis in cattle after applying warble extract by various routes].—J. E.

SEN, S. K. (1934). **The Ox Warble Fly.**—*Agric. & Livestock India.* **4.** 189-196. 3 plates. [8 refs.] [Copied *verbatim* from *Rev. Appl. Entomol.* **22.** 152].

The author reviews from the literature the heavy losses attributed to infestation of cattle by warble-flies (*Hypoderma* spp.) in different parts of the world, together with the various measures adopted for their control. In British India, where the production of hides is estimated at 25 to 35 per cent. of that for the whole world, the annual loss is at least £1,500,000. Although the damage is primarily confined to hides, infestation may also result in deterioration of milk and several other minor ills. The species occurring in India are *Hypoderma lineatum*, Vill., which primarily attacks cattle but occasionally goats, and *H. crossi*, Patton, the true warble-fly of goats, which has also been recorded from cattle. They are almost confined to dry localities, such as north-western India, and are practically absent from the moister areas, such as Madras, Assam, Burma and Ceylon. The life history of *H. lineatum* is briefly outlined.

JENSEN, E. A. (1934). Hvorledes kan Dyrlaegerne under de forhaandenvaerende Forhold og paa det bestaaende Lovgrundlag bedst bidrage til Løsningen af Oksebremselarvebekaempelsen indenfor dansk Landbrug ? [**The Veterinary Surgeon's Part in the Campaign against Ox Warbles, according to Present Regulations**].—*Maanedsskr. Dyrl.* **45.** 647-655.

Owing to slackness in the campaign in some parts of Jutland, a stricter interpretation of certain sections of the Act is recommended ; at the same time it is suggested that herd owners who have not removed the warbles when the veterinary surgeon makes his inspection should pay a considerably higher price than previously for the clearing of the infested cattle.—H. C. Bendixen (Copenhagen).

Dunn, L. H. (1934). **Prevalence and Importance of the Tropical Warble Fly, *Dermatobia hominis* Linn., in Panama.**—*J. Parasitol.* **20.** 219-226. [8 refs.]

The author describes larval myiasis caused by *D. hominis* in man and domestic and wild mammals in Panama.

According to the recent annual reports of the Governor of the Panama Canal, the losses of cattle were so great that the practice of keeping cattle at grass had to be abandoned and meat requirements had to be met by importation. After the grazing land had been cleared for one year, 70 imported steers were placed on it in order to obtain data on the incidence of the fly : it was found that they were still abundant.

The female *D. hominis* does not lay her eggs directly on the future host, but attaches them to another species of fly, *Limnophora* sp., which places the hatching larvae on the skin of the host, the larvae then penetrating the skin. This fly works so well that cattle frequently become covered with the warbles all along their bodies and some way down the legs, and die from the infestation.

This warble fly has also been demonstrated as the cause of myiasis in sheep, dogs, cats, monkeys and agoutis.—J. E.

Lawrence, D. A., & Cuthbertson, A. (1934). **Myiasis (Screw-Worm) [Maggot] in Cattle in Southern Rhodesia.**—*Rhodesia Agric. J.* **31.** 348-355. 10 figs. on 2 plates. [1 ref.]

This paper is a supplementary article to one with a similar title published previously by Cuthbertson [this *Bull.* **4.** 577.] and contains a more detailed systematic account. It is important to note that game animals are never affected and so cannot act as a reservoir for the parasite.—J. E.

Nieschulz, O., & du Toit, R. (1933). **The Occurrence of *Bdellolarynx uniseriatus* Malloch, a Blood-sucking Fly, in the Transvaal.**—*J. S. Afric. Vet. Med. Ass.* **4.** 221-222. 1 fig. [2 refs.] [Copied *verbatim* from *Rev. Appl. Entomol.* **22.** 151].

Haematobia (*Bdellolarynx*) *uniseriata*, Malloch, is recorded for the first time from the Transvaal, where it appears to be common in certain localities. It attacks horses and mules in relatively large numbers, particularly shortly before and after sunset. The adults of both sexes are briefly described.

Prado, A. (1933). Notas sobre o carrapato do chão (*Ornithodoros rostratus*). **[Notes on the Ground Tick].**—*Bol. biol.* **1.** No. 2. 54-57. 1 fig. [Copied *verbatim* from *Rev. Appl. Entomol.* **22.** 145].

The distribution of *Ornithodorus rostratus*, Arag., in Brazil is reviewed, and notes on its biology are given. The eggs, which are laid on the ground and are sensitive to drought, hatch in 15 to 20 days. The ticks attack dogs and bare-footed persons, and in the State of Matto Grosso are reported to have killed large numbers of pigs. Measures suggested for control include covering the earthen floors of huts with cement, fumigation with sulphur and dusting with pyrethrum.

Babić, I. (1934). Parazitička acarina i insecta ustanovljena kod domaćih zivotinja u Jugoslaviji. [**Parasitic Mites and Insects of Domestic Animals in Yugoslavia**].—*Vet. Arhiv.* **4.** 190-192 and 193-195. [12 refs.] [Abst. from German summary].

This is a check-list of parasitic mites and insects of domestic animals in Yugoslavia arranged under headings according to hosts.—J. E.

Feng, L. C., & Hoeppli, R. (1933). **On some Histological Changes caused by Mites.**—*Chinese Med. J.* **47.** 1191-1199. 3 plates. [15 refs.] [Copied *verbatim* from *Rev. Appl. Entomol.* **22.** 103].

After reviewing the literature on the subject of histopathological changes in man and animals due to the attack of mites (other than those causing scabies), the authors describe the results of microscopic examination of those produced in tissue from a gecko, a water beetle, and adults of *Tabanus* sp. and *Anopheles hyrcanus* var. *sinensis*, Wied., all found infested with mites in China.

Leiper, R. T. (1934). **Helminthology. A Chapter in Comparative Medicine.** [**President's Address**].—*Proc. Roy. Soc. Med. London.* **27.** 127-134. [1 ref.] [Reprinted in *Vet. Rec.*, **14.** 123-128].

In this presidential address to the Comparative Section, Royal Society of Medicine, Leiper summarizes the main points concerning the progress of helminthology and gives numerous instances to illustrate the unity of medical science and the part which comparative medicine is playing in advancing our knowledge for the control of disease caused by helminths.

An outline is given of the process by which normal parasitism has gone over to pathological parasitism and of present knowledge of the way in which disease is caused by parasitic worms and the reaction of the host to their presence.

It is considered that the usefulness of the Society might be considerably increased through the more general admission of biologists, biochemists and comparative physiologists to the discussion of disease problems.—E. L. Taylor.

Cameron, T. W. M. (1934). **Parasitic Diseases Common to Man and Animals.**—*Brit. Med. J.* June 23rd. 1110-1112. [Copied *verbatim* from *Helminth. Abst.* **3.** 30. Signed by B. G. P.]

This is the text of an address delivered by Cameron before a joint meeting of the Central Canada Veterinary Association and the Ottawa Medico-Chirurgical Society. In it he briefly discusses the parasites common to man and animals. A few parasites man has brought with him, from his simian ancestors ; such are malaria and the pin-worm. The majority, however, have been acquired by man's association with the animals he has domesticated. Adequate public health measures should bring these parasitic diseases under control.

Taylor, E. L. (1934). **A Method of Estimating the Number of Worms Present in the Fourth Stomach and Small Intestine of Sheep and Cattle for the Definite Diagnosis of Parasitic Gastritis.**—*Vet. Rec.* **14.** 474-476. 2 tables.

It is essential, for the proper diagnosis of this disease, to have some idea of the extent of infestation. Egg counts are not always reliable and the ratio of worms to eggs per g. of faeces has been observed to vary between 4 : 1 and 12,000 : 1 (in an extreme instance). It is, therefore, at times desirable to enumerate the worms at the *post-mortem* examination of one member of the flock. For this purpose, the complete contents of the fourth stomach are washed into 5 per cent. formalin solution in a large glass dish, passed through a screen of 40 meshes to the linear

inch and washed until all the colouring matter is removed [details of this procedure are given]. A weak solution of formalin (which prevents the worms from bursting) is added until the whole amount is brought up to 4,000 c.c. and a representative sample is taken by means of a trumpet-ended pipette, small quantities being drawn up while the whole is vigorously stirred and placed in a measuring cylinder until 40 c.c. have been taken. All of the worms in this 1 100th part are then counted [the original should be consulted for details of this procedure].

Diseased lambs show a count of 20,000 to 60,000 in the stomach, diseased ewes up to 130,000 and young cattle up to 140,000.—E. L. Taylor.

I. Pillers, A. W. N. (1933). **Helminths of Economic Importance in Farm Animals, Excluding Poultry.**—*Vet. Rec.* **13.** 1160-1177. 7 figs., 3 tables. [8 refs.]

II. Schmid, F. (1934). Ueber Parasiten und parasitäre Veränderungen der Harnorgane bei Silberfüchsen. [**Parasites of the Urinary Organs of Silver Foxes**].—*Berl. tierärztl. Wschr.* **50.** 33-36. 8 figs. [30 refs.]

III. Witenberg, G. (1934). **Parasitic Worms of Dogs and Cats in Palestine.**—*Vet. Rec.* **14.** 282-289. 1 table. [26 refs.]

I. This paper gives a very concise account of our present knowledge of the subject. Figures are given illustrating the life cycles and the eggs of the commoner species, lists of the species which are thought to be of the greatest economic importance, and a survey of recent contributions to the biological, pathological, therapeutic and economic side of veterinary helminthology.

At the conclusion of the interesting discussion which followed this paper it was agreed that a resolution be forwarded to form a special committee to foster a knowledge of parasitic diseases and act in an advisory capacity to the National Veterinary Medical Association.

II. Schmid found nodules caused by the larvae of *Toxocara* (*Belascaris*) *canis* in the kidneys of 85 per cent. of silver foxes on a certain farm. Some were found in eight-month-old foxes and he considers that they must have been there for seven months. He also found *Capillaria plica* in the bladder in 85 per cent. of foxes, in some instances associated with marked inflammatory changes. Although of approximately the same length, the egg of *C. plica* can easily be distinguished from that of *Eucoleus aerophilus* (the lung *Capillaria*) by its relatively large plugs and straighter sides.

III. This paper gives a review of the helminthological findings in 30 dogs and 50 cats in Palestine. Notes are given on the life histories, economic importance and prevalence of the 40 species which were encountered. It is pointed out that such a large number of species has not previously been recorded in any other country.—E. L. Taylor.

Chen, H. T. (1934). **Helminths of Cats in Fukien and Kwangtung Provinces with a List of Those recorded from China.**—*Lingnan Sci. J.* **13.** 261-273. [Copied *verbatim* from *Helminth. Abst.* **3.** 39. Signed by J. N. O.].

Chen has made a survey of the helminth parasites of cats in South China from an examination of 57 animals from Canton and 32 from Foochow. Cantonese cats harboured 19 species of worms while 7 were recorded from Foochow hosts. The high incidence of *Clonorchis sinensis* infection in Cantonese (80 per cent.) and Foochow animals (59 per cent.) confirms the author's theory that cats are the most important reservoir hosts for Clonorchiasis in South China. Apparently three species of *Monorchotrema* occur in cats, but identification is pending. *Stamnosoma* sp., sparganum in the body cavity, *Ancylostoma braziliense*, *Capillaria* sp.

and *Strongyloides* sp. are believed to be new records for Cantonese cats. A list of the helminths occurring in cats in China is given.

Poisson, H. (1934). Les helminthiases du porc à Madagascar. [**Helminthiasis of Swine in Madagascar**].—*Rec. Méd. vét. exot.* **7.** 10-15. [Copied *verbatim* from *Helminth. Abst.* **3.** 46. Signed by R. T. L.]

Apart from Cysticercosis upon which several papers have already appeared Poisson lists the helminths in pigs in Madagascar, *viz.*, *Metastrongylus brevivaginatus*, *Gnathostoma hispidum*, *Physocephalus sexalatus*, *Arduenna strongylina*, *Gigantorhynchus gigas*, *Oesophagostomum dentatum*, *Globocephalus longemucronatus*, *Ascaris suum*, *Stephanurus dentatus*, *Enchinococcus*, *Cysticercus hydatigenus* and Sparganum.

I. Skriabine, K. I., & Schulz, R. E. (1933). La prophylaxie de la fasciolose et des strongylidoses des ovins et du gros bétail. [**Prophylaxis of Fascioliasis and Strongylidosis in Sheep and Cattle**].—*Bull. Off. internat. Epiz.* **7.** 195-236.

II. Jay, R. (1933). **The Campaign against Liver Flukes in California and the Results.**—*Cornell. Vet.* **23.** 272-279. 1 map.

III. Chatron, M. (1933). Un nouveau cas de distomatose humaine à *Fasciola hepatica*. [**A New Case of Distomatosis in Man due to** *Fasciola hepatica*]. —*Bull. Soc. Path. exot.* **26.** 24-25. [5 refs.]

IV. Korkhaus, R. (1933). Bemerkungen zur Biologie der Metastrongyliden und zur Diagnostik des Lungenwurmbefalles. Eine Entgegnung an E. Lührs. [**The Biology of Metastrongyles and the Diagnosis of Lungworm Infestation**].—*Arch. wiss. prakt. Tierhlk.* **66.** 439-442. [10 refs.]

V. Lührs. (1933). Leberegel – und Lungenwurmseuche (Erwiderung auf vorstehende Entgegnung). [**Liver Fluke and Lungworm Infestation**].—*Ibid.* 443-444.

I. This paper gives a detailed account of the methods which will be practised with increasing rigour in Russia for the control of the helminth parasites of domesticated animals. The greatest damage is caused by the liver fluke, the stomach worms of sheep, the tapeworms of ruminants, hydatid cyst (*Echinococcus*), the gid worm and *Cysticercus bovis*.

It is considered important that animals should be kept under good hygienic conditions to assist in the control of the parasites and that dung should be sterilized by fermentation before being put on to the pastures. Horse-dung should be mixed with cow-dung and sheep-dung in order to hasten the fermentation process. Mass prophylactic treatment with copper sulphate is of great value in the control of haemonchosis, and mass treatment with carbon tetrachloride in the control of fascioliasis ; 5 to 7 c.c. doses are used for cattle (with caution), direct injection into the rumen being found a convenient method of administration. Intratracheal injections of Lugol's solution and glycerine give good results with *Dictyocaulus*, but rotational grazing is thought to be of the greatest value for the control of lungworms and also for the control of the smaller stomach worms.

II. Losses from fascioliasis in California had been increasingly heavy up to 1927, and in 1928 a concerted effort at control was begun, sheep being treated with 1 c.c. doses of carbon tetrachloride and the land with dressings of copper sulphate. In the control of the intermediate host, which early in the campaign was shown to be *Galba bulimoides*, the ordinary methods of applying copper sulphate were supplemented by placing sacks of the crystals in the heads of streams which were dammed up until the snail-infested banks were covered with copper sulphate

laden water, and by broadcasting powdered copper sulphate by aeroplane over marshy areas. This was carried out at the cost of one dollar per acre, and it was found that 500 or 1,000 acres could be treated satisfactorily in one day. Cases of carbon tetrachloride poisoning did not occur until after the sheep had been placed on arable land and hand-feeding had begun. Previous feeding on foods rich in calcium afforded no protection, but it was afterwards found to be important to make no change in the feeding prior to the use of this drug.

A survey of the treated areas carried out in 1931 shows a complete, or almost complete, freedom from flukes and the author states that reports from abattoirs no longer show any condemnation of sheeps' livers because of flukes.

III. This report adds another instance of the infestation of human beings with *Fasciola hepatica* to the already long list of recorded cases. Diagnosis was made by observation of the eggs in faecal examination.

IV. Korkhaus criticizes some points of Lühr's papers on the control of liver fluke and lungworm disease in districts bordering on the sea coast [this *Bull.* **4.** 169]. He points out that sheep and cattle often suffer from infestations with species of lungworms which require no intermediate host to complete their development, and that the eggs of lungworms are not found in faeces.

V. Lührs, in reply, claims to have been well aware of these points and that he had been misunderstood by Korkhaus.—E. L. Taylor.

Newsom, I. E., & Stout, E. N. (1933). **Proventriculitis in Chickens Due to Flukes.**—*Vet. Med.* **28.** 462-463. 2 figs. [1 ref.]

This is thought to be the first account of a minute trematode, *Psilostomum ondatrae*, causing death in domestic chickens. The losses occurred in a small area in the state of Colorado, most of a lot of newly bought chickens dying after several days of wasting illness. The chief symptom was enlargement of the crop. On *post-mortem* examination the wall of the crop was found to be thickened and the mucous membrane was ulcerated. The chance observation that snails abounded in a ditch to which the fowls had access suggested the search for a fluke in the crop.

The fluke, which only measured 3 × 1 mm., was found after microscopic examination and identified by Price of the U.S. Bureau of Animal Industry.—J. E.

Szidat, L. (1933). Weitere Beobachtungen über das Vorkommen und die Biologie von Prosthogonimus pellucidus v. Linst., den Erreger der Trematodenkrankheit der Legehühner, bei Enten und Gänsen in Ostpreussen. [**Further Observations on the Biology of** *Prosthogonimus pellucidus* **v. Linst. in Ducks and Geese**].—*Zlb. Bakt. I.* (*Orig.*). **127.** 392-397. [17 refs.]

P. pellucidus, a trematode which infests the oviduct, was previously thought only to cause disease in fowls. Szidat has, however, come across a centre of infection in East Prussia where ducks and geese were dying of prosthogonimiasis. Infection experiments showed that the parasite can only infect the functioning oviduct and that after the laying period has terminated it is no longer able to gain entry. He considers that it is very probable that the great reduction of partridges, which occurred from 1921 to 1926, was due to infestation with this parasite.

—E. L. Taylor.

Erhardt, A., & Orgel, D. (1934). Ein neuer Fall von Missbildung bei dem Katzenleberegel *Opisthorchis felineus* (Riv.). [**A New Case of Malformation in** *Opisthorchis felineus* **(Riv.), a Parasite of the Cat**].—*Zool. Anzeig.* **106.** 157-161. [Copied *verbatim* from *Helminth. Abst.* **3.** 52. Signed by B. G. P.]

Erhardt and Orgel describe a malformed specimen of *Opisthorchis felineus* in which the anterior ends of uterus and vesicula seminalis were occluded. The eggs had ruptured into the right caecum and were evidently voided by the mouth. The uterus was distended and eggs were also present in the receptaculum seminis but not in Laurer's canal.

I. Datta, S. C. A. (1933). *Schistosoma indicum*, **Montgomery, 1906, as the Cause of a Persistent Debility in Equines in India, with a Description of the Lesions.**—*Ind. J. Vet. Sci. & Anim. Husb.* **3.** 1-28. 21 figs. on 6 plates, 1 table. [52 refs.]

II. Datta, S. C. A. (1933). **Histopathological Studies on 12 Cases of Helminthic Granuloma of the Equine Skin.**—*United Prov. Vet. Mag.* **21.** No. 11. 1-2. [Reprinted in *J. Roy. Army Vet. Corps.* **4.** 119].

I. Datta brings forward evidence to show that the " internal bursati " of several authors and the " calcarious degenerations in the horse " described by Smith (1885) occurring in some parts of northern India are caused by infestation with *Schistosoma indicum*. The principle lesion of the disease is a nodular cirrhosis of the liver, more or less restricted to the portal tract. The disease is, however, essentially an intestinal schistosomiasis and nodules are found extensively in the wall of the large intestine, sometimes in the small intestine, and also in the mesenteric lymphatic glands and in the lungs. Section of the nodules in the liver or intestines reveals the presence of the terminal-spined eggs of the parasite. A description is given of the morbid anatomy together with an account of the clinical history of eight specific cases of the disease. It is considered that, apart from malnutrition, infection with *S. indicum* is the most important cause of persistent debility in equines in India.

II. A short description is given of the appearance of sections of a bursati sore in which nematode larvae, thought to be those of *Habronema*, were seen in the thrombus material within the blood vessels of the granulation tissue. Comparison of the tissue with some from a case of cutaneous habronemiasis in Greece showed the two conditions to be identical.—E. L. Taylor.

I. Wetzel. (1933). Zur Kenntnis des Entwicklungskreises des Hühnerbandwurmes Raillietina cesticillus. [**The Life Cycle of** *Raillietina cesticillus*].—*Deuts. tierärztl. Wschr.* **41.** 465-467. 2 figs. [8 refs.]

II. Moghe, M. A. (1933). **Four New Species of Avian Cestodes from India.**—*Parasitology.* **25.** 333-341. 14 figs., 1 table. [9 refs.]

I. Of the several species of beetles known to act as intermediate hosts for this cestode in America, only one occurs naturally in Europe. Wetzel therefore set out to find the common intermediate host in Germany and in 179 dissections of 17 different species found the cysticercoids in the following three kinds of ground beetle :– *Calathus erratus*, *C. ambiguus* and *C. fuscipes*. The cysticercoids which are described were afterwards fed to chickens and the adult worms obtained. Maturity was reached in 19 to 20 days after the experimental feed was given, which is six days less than the time recorded by the American investigators.

II. A new genus, *Baeria*, closely related to *Paranoplocephala*, is made for the reception of a species *B. orbinterina* collected from the intestine and gizzard of *Tierdoides somervillei*. The three other new species which are also described are *Ophzocolytoides meggitti* from *Corvus splendens*, *Hymenolepis oweni* from *Philomachus pugnax* and *Uncinnia acapillicirrosa* from *Anas platyrhyncha*.

—E. L. Taylor.

Barnett, L. (1934). **The Incidence of Hydatid Disease in New Zealand.**—*New Zealand Med. J.* **33.** 191-196. 4 tables.

This is a most illuminating statistical article by the Emeritus Professor of Surgery of the Otago Medical School, revealing the large number of cases of human hydatid disease which occurs annually in New Zealand.

In 43 years he estimates that 3,500 cases have been operated upon, with a mortality rate of 15 per cent. In 1933, out of every 677 hospital patients, one was affected with hydatids. New Zealand is shown to have a lower incidence actually than have Victoria, New South Wales, South Australia and Tasmania. The author mentions the localization of the disease in certain districts. Hydatid disease is on the increase as the population increases and is most common in Canterbury, then in Otago and lastly in the North Island.

It is not for want of educational instruction that hydatid disease is so prevalent in man, for not only the medical practitioners but all veterinarians of the Agriculture Department are interested in controlling the parasite.

In spite of these efforts, stock are still seriously affected in many districts.

—C. S. M. Hopkirk.

I. Pillers, A. W. N. (1934). **Notes on the Canine and Feline Tapeworms with Elliptical Segments.**—*Vet. Rec.* **14.** 301-309. [2 refs.]

II. Tarassow, W. (1934). Das Schwein und der Hund als endgültige Träger des Diphyllobothrium latum. [**The Pig and the Dog as Carriers of** *Diphyllobothrium latum*].—*Arch. Schiffs.- u. Trop. Hyg.* **38.** 156-159. 3 tables. [1 ref.]

I. This paper gives some brief notes on the synonymy and differentiation of the common Diphylidiinae of dogs and cats and useful clinical observations concerning diagnosis and treatment. Saline purgatives are advised, followed by a fast of 24 or 40 hours' duration and treatment with arecoline hydrobromide, but it is pointed out that the successful removal of the worms is by no means certain.

II. The author demonstrated experimentally that pigs can be infected with *Diphyllobothrium latum*, and afterwards found that, in certain endemic areas of *Diphyllobothrium* infestation, up to 100 per cent. of the pigs were carrying these worms. [This appears to be the first observation of the normal infection of pigs with the adult stage of a cestode].

In experiments on the infection of dogs he noticed that a particularly large percentage of eggs from worms in dogs give rise to coracidia and he considers this host to be of great importance in connection with the control of the parasite.

—E. L. Taylor.

I. Lörincz, F. (1933). Die Rolle der Katze in der Verbreitung der Echinococcosis. [**The Role of the Cat in the Dissemination of Echinococcosis**].—*Zlb. Bakt. I. (Orig.).* **129.** 1-11. 30 figs., 1 table. [11 refs.]

II. —. (1933). **The Echinococcus in Europe.**—*Lancet.* **224.** 825-826.

I. Most of the text-books on parasitology cite the cat as a definite host for *Echinococcus granulosus*, but Lörincz, who in this paper reports the results of his experimental feeding to 11 dogs and 51 cats, found the cat to be an unsuitable animal for the development of the parasite, in which host it develops much more slowly than in the dog and does not appear to be able to reach maturity. A majority of the experimental cats also suffered from a marked diarrhoea as a result of the infestation, which further indicates their unsuitability as hosts for this parasite. The experimental dogs showed no such symptoms and it was noted that sexual maturity was reached in these animals in 36 days.

II. Recent statistical studies by Lörincz and Bodrogi show that Greece is the area in Europe most affected by echinococcosis, as many as one person in 1,000 being affected in some parts, and in one district the figure was as high as one in 529. The observation has been made in Hungary that echinococcal cysts are much more prevalent among rural than among urban populations.

—E. L. Taylor.

Adams, A. R. D. (1933). **Report on a Collection of Nematodes from the Federated Malay States.**—*Ann. Trop. Med. & Parasitol.* **27.** 1-13. 12 figs. [1 ref.]

In this paper Adams reports on his examination of a collection, made by G. B. Purvis, of some 300 tubes of parasitic worms, mostly from the Malay States. Over 60 species are recorded ; most of them are well known to science, but *Ancylostoma malayanum* is worthy of mention as an unusual find and *Syngamus trachea* in the goose – as the second report of its occurrence in that host.

Two new species are also described and placed in new genera, *Cyclodontostomum purvisi*, a member of the Ancylostominae from a rat ; and *Labiatofilaria tringae* referable to the subfamily Aproctinae from the knot [a wading bird].

—E. L. Taylor.

I. Stewart, J. (1933). **The Effect of Nematode Infestations on the Metabolism of the Host. Part I. Metabolism Experiments. Part II. The Isolation of a Substance Capable of Inhibiting Enzyme Action.**—*3rd Rep. Direct. Inst. Anim. Path. Univ. Cambridge, 1932-1933.* pp. 58-76 and 77-86. 7 tables.

II. Shearer, G. D., & Stewart, J. (1933). **The Effect of Nematode Infestations on the Metabolism of the Host. Part III. The Effects of Nematode Infestations on Mineral Metabolism.**—*Ibid.* pp. 87-129. 4 tables, 1 appendix. [23 refs.]

I. In the first paper an account is given of a series of experiments which have been carried out to ascertain the effect of a nematode infestation – mostly species of trichostrongyles in the fourth stomach and small intestine of sheep – upon the digestion of food substances. Sheep carrying a more or less heavy infestation which had been naturally acquired were placed in metabolism cages and kept there for six weeks before the observational period began.

They were then fed on a diet of known composition, a careful check being kept on the exact amount which they ate : solid and liquid excreta were collected for analysis, and digestibility coefficients of the ration (crude protein, ether extract, nitrogen-free extract, crude fibre and organic matter) and a complete account of the nitrogen balance was estimated for every 14 days over a period of 18 to 26 weeks.

At various periods anthelmintic treatment was given to the lambs to reduce the infestation, the degree of which was estimated by egg counts.

The results show a marked correlation between the digestibility coefficient of crude protein and the number of eggs passed in the faeces, but little or no relationship between the egg count and the digestibility coefficients of the other components of the ration. The author concludes that these observations clearly establish the serious effect of heavy nematode infestations on the digestibility of the crude protein, and proceeds to consider how this is brought about.

In referring to Fourie's work, the author mentions the causation of haemorrhage into the stomach as a possible source of considerable error in his calculations, but, as he was unable to demonstrate haemoglobin in the contents of abomasum and intestines of sheep considered to have died from a heavy infestation, he concluded the error from this source to be negligible. [Fourie concluded, after a

careful haematological study, that the anaemia of haemonchosis is entirely due to the abstraction of blood by the twisted wire-worm – *Haemonchus contortus*. The hookworm of the dog is a very different parasite, but in considering these results it may be as well to recall Wells's findings that each hookworm withdraws about 0·85 c.c. of blood in 24 hours. These observations suggest that blood proteins would find their way into the bowel contents in Stewart's experiments].

In the second paper a report is given of tests carried out on seven different extracts, prepared from the nematodes collected from the fourth stomach of different groups of sheep, to ascertain whether any action could be demonstrated in inhibiting peptic digestion. The ratio of pepsin activity in the control tubes to that in the tubes containing the various extracts was found to be 132 : 43, 127 : 71, 128 : 32, 154 : 124, 194 : 68 and in one instance no difference was detected. It is concluded that the tissues and juices of these nematodes contain an anti-enzyme which inhibits the action of proteolytic enzymes secreted by the host. The author suggests that the word "nezyme" be used so that there shall be no confusion with the "anti-enzyme" of immunology.

II. The third paper gives an account of observations on five lambs, designed to ascertain the influence of nematode infestation on mineral metabolism. The net absorption (excess of absorption over excretion in the faeces) was found to be subject to too great a variation, but it was observed that, from a negative calcium and phosphorus balance at the beginning of the experiment, the metabolism changed to a positive balance as the worm infestation decreased, and it was concluded that the nematodes interfere with the absorption of these minerals. No action was, however, observed upon sodium and potassium metabolism.

—E. L. Taylor.

I. Wagner, O. (1933). Immunisierungsversuche bei experimenteller Askaris-Infektion der Maus. [**Immunization of the Mouse against Experimental *Ascaris* Infection**]. *Zschr. Immun.-forsch.* **78.** 372-382. 2 tables. [6 refs.]

II. Matfernowska, Irena. (1933). Intradermale Hautreaktion bei Trichinose. [**Intradermal Reaction in Trichinosis**]. *Zlb. Bakt. I.* (*Orig.*). **129.** 284-301. 6 figs., 2 tables. [4 refs.]

III. Matfernowska, Irena. (1933). Odczyn śródskórny przy włośnicy u zwierząt i ludzi. [**Intracutaneous Reaction in Trichinosis in Animals and Man**]. — *Rozprawy Biol.* **11.** 93-126. 6 figs., 5 tables. [5 refs.] [German summary].

I. Since ascaris larvae come into such close contact with the tissues of the host, they might be expected to give rise to an immunity response and this is in accordance with the author's observations. Mice which had passed through two or more previous infestations passed more easily through a third. The time required for the migration in the third or subsequent migrations was not altered, but fewer larvae succeeded in reaching the liver and lungs. It was found possible to stimulate a similar immunity by feeding dried powdered ascaris to the mice.

II. Tests have been carried out in human beings, pigs, and laboratory animals which show this method of diagnosis to be highly efficient. Positive results were obtained from five to 400 days after infestation had taken place. The reaction varies with the duration of the infestation, the peculiarity of the skin, the extent of the infestation and the concentration of the antigen. This is prepared from washed, dried and pulverized adult trichinae from rabbits' intestines, suspended in physiological saline. The reaction appears in two phases more or less clearly separated from one another, firstly an oedematous swelling which reaches its height in about nine hours and secondly an infiltration, principally of lymph

cells, which reaches its height in 24 to 28 hours and terminates in 40 to 52 hours.

[Previous trials with the intradermal method of diagnosis have been made with an antigen prepared from dried pulverized larvae, but did not give such satisfactory results – this *Bull.* **4.** 366].

III. [Substantially the same as II.—Ed.].—E. L. Taylor.

I. Homedes, J. (1933). Estudio del aparato cromosómico de los Ascaris suilla y Ascaris vitulorum Goëze. [**The Chromosome Apparatus of** *Ascaris suilla* [*lumbricoides*] **and** *A. vitulorum* **Goeze**].—*Trab. Inst. Biol. anim. Madrid.* **1.** 17-24. 8 figs. [21 refs.]

II. García, I. (1933). El Stephanurus dentatus en España. (Nota parasitológica). [*Stephanurus dentatus* **in Spain. Parasitological Note**].—*Ibid.* 84-90. 6 figs. [12 refs.]

III. Reyes, R. V. (1933). El parasitismo en la sabana de Bogotá. [**Parasitic Infestation on the Bogotá Plains**].—*Rev. Med. vet. Bogotá.* **5.** 663-680.

I. In an exhaustive cytological study of the chromosome apparatus of *A. lumbricoides* and *A. vitulorum* the author failed to discover differentiating features.

II. A detailed description is given of *S. dentatus*, the kidney worm of swine, now identified in Spain for the second time.

III. An account is given of a survey of parasitic worms of farm animals. The parasites identified and their positions in the host are shown in a list. Twenty species not previously known to exist in Colombia are included, among them being *Monieza expansa*, *Strongylus equinus*, *Ostertagia ostertagi* and *Trichuris afinis*. The remainder of the paper is devoted to case reports of individual animals which had received anthelmintic treatment. The results are difficult to evaluate as a very slight reduction in the number of ova passed is accepted as an indication of efficacy.

—R. S. Roberts.

I. Metsch, H. (1933). Untersuchungen über die Bedeutung wandernder Spulwurmlarven als Ueberträger von Infektionskrankheiten. [**On the Significance of Ascaris Larvae as Carriers of Disease**].—*Inaug. Diss. Leipzig.* pp. 53. [56 refs.]

II. Sarles, M. P. (1933). **Resistance of the Cat to Ascaris Infection.**—*J. Parasitol.* **20.** 126-127. [Ninth Ann. Meet. Amer. Soc. Parasitologists, 28th–30th Dec.]

III. Schmid, F. (1933). Zur Identität der Kalberaskariden. [**The Identity of Calf Ascarids**].—*Münch. tierärztl. Wschr.* **84.** 569-571. 8 figs. [26 refs.]

I. The author repeats the experiments of Taylor and Purchase [this *Bull.* **2.** 336.] using the embryonated eggs of *Parascaris equorum* and *Ascaris lumbricoides* in guinea pigs and mice along with virulent cultures of *Bact. enteritidis* Gärtner, *Bact. enteritidis* Breslau, *Bact. paratyphosum* B., *B. erysipelatos suis* [*Erysipelothrix rhusiopathiae*], *B. anthracis*, *Clostridium chauvoei*, *B. parasarkophysematus*, *Cl. welchii* and *Cl. novyi*. He concludes, as did the authors referred to above, that by penetrating the wall of the intestine these larvae do not assist bacterial invasion.

II. In a series of observations on the experimental infestation of both kittens and adult cats with doses of embryonated eggs of *Toxocara* (*Belascaris*) *cati*, a remarkably strong resistance was observed and infestation could only occasionally be produced. Migration of the larvae to the lungs apparently occurred in the normal way, but the parasite did not mature in the gut. [This appears to be the same kind

of resistance as has been observed in experimental infestation of the pig with *Ascaris lumbricoides*].

III. On morphological grounds, and on the distribution of the ascaris of the calf (*A. vitulorum*), Schmid concludes that it is specifically distinct from *A. lumbricoides*. An attempt to infest a pig was unsuccessful. [There can be no doubt, however, that *A. lumbricoides* does at times occur in the calf, although apparently it is usually unable to mature there].—E. L. Taylor.

I. Morgan, D. O., & Clapham, P. A. (1934). **Some Observations on Gape-Worm in Poultry and Game Birds.**—*J. Helminthol.* **12.** 63-70. [7 refs.]

II. Buckley, J. J. C. (1934). **On *Syngamus ierei* sp. nov. from Domestic Cats, with Some Observations on its Life-Cycle.**—*Ibid.* 89-98. 14 figs. [11 refs.]

III. Buckley, J. J. C. (1934). **On *Syngamus nasicola* Linstow, 1899, from Sheep and Cattle in the West Indies.**—*Ibid.* 47-62. 13 figs. [15 refs.]

I. Attempts to infect chickens by means of the third-stage larvae of strains of *Syngamus trachea* obtained from rooks, starlings, partridges and pheasants were, in general, unsuccessful. When, however, the infective larvae of the various strains had been ingested by earthworms (*Lumbricus terrestris* and *Eisenia foetida*) and these intermediate hosts fed to chickens, the transference was much more successful, and chickens were infected with up to 14 pairs of gapeworms of the rook and of the pheasant strain.

Failure to transfer the starling strain and the partridge strain is thought to have been due to the small amount of infective material which was originally available.

II. A new species of *Syngamus*, found to occur in the pharynx and nares of a large percentage of domestic cats in various parts of Trinidad, is here described. An attempt to infect cats by direct feeding of the third stage larvae was not successful, and it is thought that an intermediate host must be required.

III. Ten out of 18 sheep, three out of 20 cattle and one out of three goats in the West Indies were found to be infested with a species of *Syngamus*, as many as 76 pairs being found in the pharynx, trachea and nares of one sheep. The species, which is fully described, differs from *S. laryngeus*, but appears to be identical with *S. kingi* and is, doubtless, the one originally described by von Linstow as *S. nasicola*. *S. kingi*, therefore, falls into synonymy.—E. L. Taylor.

I. Baker, D. W. (1933). **Trichostrongylus in New York State.**—*Cornell Vet.* **23.** 71-73. [4 refs.]

II. Bhalerao, G. D. (1933). **The Most Practical Methods of Combating Parasitic Gastritis and Fluke Infestation of Ruminants Under Field Conditions in India.**—*Agric. & Livestock India.* **3.** 354-360. [6 refs.]

III. Fraser, A. H. H., & Robertson, D. (1933). **The Influence of the Nutritional State of the Sheep on its Susceptibility to Infestation with the Stomach Worm,** *Haemonchus contortus*.—*Empire J. Exp. Agric.* **1.** No. 1. 17-21. 1 chart. [11 refs.]

IV. Threlkeld, W. L. (1934). **The Life History of** *Ostertagia circumcincta*.—*Virginia Agric. Expt. Sta. Tech. Bull.* No. 52. pp. 24. 21 figs. on 4 plates, 1 table. [22 refs.]

I. *Trichostrongylus axii* was found in large numbers in lambs showing the symptoms of parasitic gastritis and was thought to be responsible for their diseased condition and for the death of about one quarter of the flock. A dose of 5 c.c. tetrachlorethylene appeared to bring about considerable improvement. *T. axii* was also found associated with a patchy gastritis in horses, in the fourth stomach

of a calf which had suffered from chronic bloody diarrhoea and in inflamed areas in the stomach of a racoon.

II. The interest in this paper lies chiefly in the fact that the author mentions the most important parasites concerned in the causation of parasitic gastritis and liver rot in domestic ruminants in India. *Haemonchus contortus*, *H. similis* and *Mecistocirrus digitatus* are regarded as chiefly responsible for the production of parasitic gastritis in cattle, of which *M. digitatus* is the most dangerous ; and *H. contortus*, *O. circumcincta* and *O. orientalis* as the principle causes of the disease in sheep and goats, *H. contortus* being regarded as the worst. *Fasciola gigantica* is considered to be a more common cause of liver rot in ruminants than is *F. hepatica*. In connection with the treatment of this disease, trials on 120 cattle with carbon tetrachloride are recorded ; 82 per cent. of the animals recovered after this treatment.

[Doses of 1½ and 3½ oz. of copper sulphate which are mentioned, presumably refer to fluid ounces of a 1 per cent. solution].

III. Two groups of worm-free lambs were placed together on infected pasture at the age of three months, and maintained there throughout a period of 46 days, one group receiving more concentrated food than the other. At *post-mortem* examination, all *H. contortus* were collected from the fourth stomach and counted, when it was found that the individual lambs in the well-fed group contained an average of only 31 worms, and those in the poorly-fed group an average of 103. Surprising variation between individual lambs within each group were, however, observed, ranging between 2 and 76 in the well-fed group and 0 and 222 in the poorly-fed group.

IV. Observations on the free-living and parasitic development of *O. circumcincta* showed that the eggs hatch in 18 to 24 hours, and that the infective larvae appear 73 to 77 hours later. Unsheathed third stage larvae were only found after three days in the host ; on the fourth day practically all of the larvae were found coiled deep in the mucous membrane of the abomasum and, on the seventh day, fourth stage larvae were found free in the lumen of the abomasum. On the eighth day fourth and fifth stage larvae [the stage following the fourth and last molt is usually called the immature adult] were found in the mucosa and a few gravid adults were observed on the 15th day.—E. L. Taylor.

Neveu-Lemaire, M. (1934). Sur la classification des trichostrongylidés. [**Classification of Trichostrongylids**].—*Ann. Parasitol.* **12.** 248-252. [Copied *verbatim* from *Helminth. Abst.* **3.** 28. Signed by B. G. P.]

Neveu-Lemaire considers that some new sub-divisions of the Trichostrongyloidea are desirable for the ready classification of what has recently become a very large group.

He recognizes the following 3 families with their sub-divisions : I. Trichostrongylidae, with double uteri and no buccal capsule, containing the *Trichostrongylinae* and *Nematodirinae* n.subf. 2. Amidostomidae, with double uteri and a rudimentary capsule. 3. Heligmosomidae, with a single uterus, containing the *Heligmosominae*, *Viannaiainae* n.subf. and *Ollulaninae*.

Taylor, E. L. (1934). **Field Experiments on the Immunity of Lambs to Parasitic Gastritis caused by a Mixed Infection of Trichostrongylid Nematodes.**—*J. Helminthol.* **12.** 143-164. 2 tables, 4 graphs. [13 refs.]

Four groups, of four worm-free lambs each, were placed successively on an area of infected pasture at intervals throughout the summer months, observations being made on the resulting infestation and disease by means of weekly egg counts on the faeces and weekly weighings of the lambs.

The first group of four lambs, which were placed on the plot of ground at an age of only three weeks and when the plot was only lightly infected, survived throughout the whole of the experimental period of 260 days. Of the second group, which were taken out of the buildings and placed in the infected pen some six weeks later, when the ground had become more heavily infected, three died after an average survival period of 182 days. Of the third group, which were older still, and placed in the pen along with the others when the ground was still more heavily infected, three died of parasitic gastritis within 51 days and the fourth in 115 days ; and of the fourth group, three died of parasitic gastritis within 84 days, the fourth surviving till the end of the experiment. It was concluded that lambs are capable of acquiring an immunity against parasitic gastritis powerful enough to protect them against a rate of re-infestation sufficiently great to cause the death of lambs not so protected in less than seven weeks.

Some of the lambs which survived were found to carry more worms than some of those that died, showing that the immunity acted against the injurious effects, as well as against the acquisition of infestation.

Observations were also made on the inhibitory influence of the immunity upon the egg production of female worms and upon the development of young worms. The immunity also appeared to be specific in that it acted more powerfully upon *Haemonchus contortus* and *Nematodiros filicollis* than upon *Ostertagia* spp., *Trichostrongylus* spp. or *Cooperia* spp.—E. L. Taylor.

I. Cram, Eloise B., & Wehr, E. E. (1934). **The Status of Species of *Trichostrongylus* of Birds.**—*Parasitology*. **26.** 335-339. 13 figs. [9 refs.]

II. Cram, Eloise B., & Cuvillier, Eugenia. (1934). **Observations on *Trichostrongylus tenuis* Infestation in Domestic and Game Birds in the United States.**—*Ibid.* 340-345. [3 refs.]

I. On attempting to determine the specific identity of *Trichostrongylus* from ring-necked pheasants and domestic geese from two different localities in the United States, it was found that the existing specific descriptions of *T. tenuis* and *T. pergracilis* are inadequate for a critical differentiation. The authors, therefore, compared their specimens with material from British grouse and partridges and finally concluded that only one species is involved. *T. pergracilis*, therefore, falls as a synonym of *T. tenuis* (Mehlis 1846) Railliet and Henry, 1909. This species is redescribed in detail, with the aid of figures.

II. The second paper deals with the biological and pathological phases of these infestations. Heavy infestations of *T. tenuis* were found, associated with disease and heavy mortality in young geese and also in a flock of pheasants. Transmission of the pheasant strain to various other host species was attempted, and gave the following results :– 1 duck, negative ; 1 pigeon, negative ; 2 turkeys, 1 negative, 1 positive ; 1 guinea fowl, positive ; 20 chickens, 2 negative, 18 positive.

The shortest period for the development of the infective larvae was six days, and for the appearance of eggs in the droppings of a freshly infected bird, seven days. The chief clinical effect observed in experimentally infected chickens was diarrhoea from the caeca in the early stages, followed by a cessation of the function of the caeca, an acute typhlitis being in evidence at *post-mortem* examination. None of the experimental chicks died as a result of the infestation.

—E. L. Taylor.

I. Baylis, H. A. (1933). **A New Species of the Nematode Genus *Uncinaria* from a Sea-Lion, with Some Observations on Related Species.**—*Parasitology*. **25.** 308-316. 9 figs. [14 refs.]

II. Davtjan, E. A. (1933). Ein neuer Nematode aus den Lungen der Hauskatze. Osleroides massino, nov. sp. [**A New Nematode from the Lung of the Cat. *Osleroides massino* n.sp.**].—*Deuts. tierärztl. Wschr.* **41.** 372-374. 5 figs., 1 table. [4 refs.]

I. Baylis here describes a new species of *Uncinaria* under the name *U. hamiltoni*; the specimens were collected in the Falkland Islands and may belong to the same species of *Uncinaria* as the one which has been considered the most important cause of mortality among young seal pups in the Bering Sea. A study was also made of specimens belonging to this genus collected from dogs, foxes, wolves and badgers in several different countries. From the comparison of this material, Baylis concludes that *U. polaris*, a species erected by Looss for a form from the silver fox, is identical with *U. stenocephala*.

Specimens of *U. lotoris* Schwartz, 1925, *U. longispiculum* Maplestone, 1931, and *U. philippinensis* Chitwood, 1932, were also examined. The author agrees with Schwartz that *U. lotoris* has quite distinctive characters, but he considers the two last mentioned species to be identical.

II. Of 100 cats examined by Davtjan in Armenia, 30 were found to be infected with a new species of *Osleroides* which is described in this paper and named *O. massino*. The worms were found in the small bronchi and the intensity of the infestation usually ranged between one and 12. No worm nodules were seen. The presence of cervical papillae is considered to be the principal difference between the species and *O. felis*, but other differences are also cited.

—E. L. Taylor.

Scaduto, P. (1933). Alcuni animali da cortile ed i passeri quali vettori della diffusione a distanza delle uova di ankylostoma. [**Sparrows and Farmyard Animals as Spreaders of Hookworm Eggs**].—*Arch. ital. Sci. med. colon.* **14.** 705-711. [14 refs.] [English summary]. [Copied *verbatim* from *Trop. Dis. Bull.* **31.** 393. Signed by H. H. S.]

The author administered orally to sparrows, chickens, ducks, turkeys and rabbits small quantities of human faeces containing ova of hookworm. In every case, after a few hours the eggs were passed and culture proved them to be viable. The author is of opinion that the risk of dissemination by these birds is not a small one.

Spindler, L. A. (1934). **Field and Laboratory Studies on the Behaviour of the Larvae of the Swine Kidney Worm, *Stephanurus dentatus*.**—*U.S. Dept. Agric. Tech. Bull.* No. 405. pp. 17. [Copied *verbatim* from *Helminth. Abst.* **3.** 49. Signed by T. W. M. C.]

Spindler finds the larvae of *Stephanurus* in Georgia almost entirely on moist, shaded soil, particularly under piles of debris where pigs are fed: they were rare in the wallows. In the debris they live for over two months, but on unshaded packed soil for only three days. They are very susceptible to low temperatures, to exposure to sunlight, to drying and to heat.

de Jesus, Z. (1933). **The Resistance of the Eggs and Larvae of Swine Kidney Worm, *Stephanurus dentatus* Diesing, with Special Reference to the Control of Stephanuriasis.**—*Gaz. Bureau Anim. Indust. Philippine Is.* **3.** 98-108. [5 refs.]

Experiments on the effects of crude common salt, copper sulphate, creolin, dryness in the shade, dryness in bright sunlight and bright sunlight in the presence of moisture, gave additional evidence on the comparatively low powers of resistance

of the eggs and larvae of this nematode. Most of the trials showed the larvae to be slightly less resistant than the eggs and the author finally recommends the use of 4 per cent. common salt or 1 : 10,000 copper sulphate in pig wallows, spraying damp ground with slightly stronger solutions of these substances and spraying the pig sties with 1 per cent. creolin : the treatments should be carried out every four days.

Infective larvae were observed to be capable of retaining their vitality for 56 days.

[The tables of experimental data, to which frequent reference is made in the text, appear to have been omitted].—E. L. Taylor.

I. Dikmans, G. (1934). **Nematodes as the Cause of a Recently Discovered Skin Disease of Cattle in the United States.**—*North. Amer. Vet.* **15.** No. 6. 22-25. 4 figs. [1 ref.]

II. Chitwood, B. G. (1934). **A Nematode, *Stephanofilaria stilesi*, New Species, from the Skin of Cattle in the United States.**—*Ibid.* 25-27. 1 fig. [3 refs.]

I. Dikmans gives an account of the isolation of nematodes from skin lesions of cattle in Colorado, South Dakota, Nebraska and Wyoming. The lesions appear to be very similar to those previously described by de Does in 1911 as occurring on cattle in Sumatra. They occur on any part of the body, but the sides of the neck, the withers, the hump, shoulders, dewlap, sides of the chest and inner canthus of the eye are most often affected. The disease is of the nature of a dermatitis squamosa et crustosa circumscripta. The nematodes can be found in the epithelium and diagnosis is made by scraping the affected area and examining the scraping for nematodes. Certain species of flies failed to transmit the disease. There is a photograph of the lesions and three figures showing the worms *in situ*.

II. This is a description of the nematode *Stephanofilaria stilesi*, found in skin lesions of American cattle. The adult male measures 3 to 3·5 mm. long and 40 to 50μ wide and has dissimilar spicules, viz : the right 47μ and the left 276μ long. The female is 5·64 to 5·8 mm. long and 100 to 117μ wide. The embryos are enclosed within a flexible membrane at deposition. The larva measures 680μ in length. The anterior and posterior extremities of the male and female are figured. *S. stilesi* differs from *S. dedoesi* of Ihle and Ihle-Landenberg in small details of the second row of cephalic spines and in the distance of the vulva from the anterior extremity.—A. W. N. Pillers.

IMMUNITY.

I. McEwen, A. D., & Roberts, R. S. (1934). **The Results of the Double Intradermal Test for Tuberculosis in a Small Dairy Herd.**—*J. Comp. Path. & Therap.* **47.** 32-48. 16 tables. [3 refs.]

II. Waters, W. (1934). **A Criticism of the Double Intradermal Tuberculin Test. [Correspondence].**—*Vet. Rec.* **14.** 1078.

I. McEwen and Roberts record the results obtained in the application of the double intradermal tuberculin test (neck) for tuberculosis in a dairy herd consisting of 29 cows producing Grade A (tuberculin-tested) milk. During a period of 18 months, 14 cows reacted to the test and were removed from the herd. The authors have been responsible for the tests since June, 1930, and it is mainly with this period that the present report deals. From June, 1930, until the end of 1932, the tests were made at intervals of six months. The following table gives details :–

Test.	Year.	Cows Tested.	Reacted.	Test.	Year.	Cows Tested.	Reacted.
2nd	June, 1928	18	2	9th	December, 1931	30	0
3rd	December, 1928	23	4	10th	June, 1932	27	0
4th	June, 1929	20	0	11th	December, 1932	29	3
5th	December, 1929	21	0	12th	January, 1933	27	1*
6th	June, 1930	19	1	13th	March, 1933	25	6
7th	December, 1930	22	1	14th	October, 1933	23	4
8th	June, 1931	22	0		* Five doubtful reactors.		

From June, 1930, recruitment to the herd was confined to tuberculin-tested maiden heifers and these were kept in isolation and retested before being brought into the milking herd. Similar precautions were taken with the home-bred stock. As a further precaution, since 1930 the milking herd has not been housed and is brought to the sheds only at milking time.

At the 12th, 13th and 14th tuberculin tests, anomalous results were obtained. The authors discuss several possible explanations of these results.

In April, 1933, ten cows which had previously reacted to the test were retested and five of these animals passed the test.

The authors' comment on this test is :–" These results showed that there was no constant correlation between the results of the two tests and they corresponded to the anomalous results previously obtained when animals giving doubtful reactions had been retested."

No evidence of tuberculosis was found on *post-mortem* examination of the five animals that passed the April test, and guinea pig inoculations with the principal lymphatic glands gave negative results.

In another animal that gave a positive reaction to the tuberculin test in March and again in April no evidence of tuberculosis could be found.

Other examples of discrepancies in the results obtained with the double intradermal test are given.

II. Waters reports anomalous results with the double intradermal tuberculin test. In a pedigree herd, where all practicable precautions were taken to control tuberculosis, three cows which had previously passed four successive tests reacted ; two gave good reactions and the third a less definite reaction.

The author made a *post-mortem* examination of the three animals, in the presence of two other veterinary surgeons, but failed to find any macroscopic evidence of the disease.—T. M. Doyle.

I. Iwanoff, K. (1933). Unspezifische Tuberkulinreaktion bei Hühnern. [**Non-Specific Tuberculin Reactions in Fowls**].—*Arch. wiss. prakt. Tierhlk.* **67.** 91-101. 2 tables. [22 refs.]

II. Elsner, E. (1933). Untersuchungen über die Verwertbarkeit der Präzipitation zur Feststellung der Tuberkulose beim Geflügel. [**Precipitation Tests for Avian Tuberculosis**].—*Prag. Arch. Tiermed.* **13.** 143-153. 5 tables.

III. Lash, E. (1933). **Eradicating Tuberculosis from Poultry and Swine.**—*U.S. Dept. Agric. Leaflet.* No. **102.** pp. 8. 7 figs.

I. Positive reactions to the intradermal tuberculin test in the wattle were produced in 90 per cent. of fowls by a previous subcutaneous injection of tuberculin and normal swine serum simultaneously, in a smaller percentage by tuberculin or swine serum alone, but never by horse serum. Reactions also occurred in birds which were given fowl pox vaccine and in some which had diphtheria vaccine.

[Author treats these as separate diseases whereas they are caused by the same virus]. Re-injection of tuberculin subcutaneously produced anamnesis of previous specific intradermal tuberculin reactions, but not of the non-specific reactions. The non-specific reactions were more transient than specific reactions and the ability to react disappeared permanently after one test injection. In all, observations were made on about 800 birds.

II. The intradermal tuberculin test is preferred to either of the three precipitation methods used because it is more easily carried out and read. In the case of the 34 birds, its results agreed completely with the *post-mortem* findings.

III. A popular bulletin which points out the association between tuberculosis in poultry and swine, its widespread nature in certain states and the means of combating it.—A. W. Stableforth.

I. Berge, R., & Ekrem, A. (1934). Die Frischmilchschnellagglutinationsmethode zur Diagnose der Brucella-Infektion bei Kühen. [**The Rapid Whole Milk Agglutination Test for Contagious Abortion**].—*Deuts. tierärztl. Wschr.* **42.** 211-214. 3 tables. [12 refs.]

II. Kitselman, C. H. (1934). **The Use of Various Agents in an Attempt to Influence the Brucella Agglutinin Content of the Blood.**—*J. Amer. Vet. Med. Ass.* **84.** 603-608. 4 tables. [6 refs.]

III. Lachner, H. (1934). Vergleichende Untersuchungen bei Rinderföten und Meerschweinchen über einige durch Bang-Bazillen hervorgerufene Veränderungen. [**Comparative Changes caused by *Br. abortus* in Bovine Foetuses and Guinea Pigs**].—*Tierärztl. Rdsch.* **40.** 243-246 and 251-253. 4 figs. [27 refs.]

I. Berge and Ekrem have found that for low titre sera the rapid agglutination method using whole milk is somewhat less reliable than the ordinary test tube method, but that with sera which have a titre of 1 : 30 or over by the slow method the two methods give nearly similar results. They have also, by means of guinea pigs, isolated brucella from 51 out of 56 samples (91 per cent.) which had a titre of 1 : 30 or over, but only from three out of 15 samples which had a titre below 1 : 30 (20 per cent.). They conclude, therefore, that the rapid whole milk test is of real value and would be particularly useful to private practitioners.

II. Intravenous injections of formalin, " proflavine", " acriflavine ", " metaphen", " guaicol " and " azamine " were not followed by any observable beneficial effects. Prostration and high temperature followed each intravenous injection of brucella bacterin into infected cows. Haemorrhagic septicaemia bacterin did not cause the development of brucella agglutinins.

III. From his study of 16 bovine foetuses and 40 guinea pigs, Lachner expresses the opinion that the changes produced in the liver and lungs by *Br. abortus* infection show certain points of similarity in the two species. The focal development of the infection in guinea pigs finds, however, no parallel in the foetus. —A. W. Stableforth.

Plummer, Helen. (1934). **The Accuracy of the Skin Test in Chinchilla Rabbits in the Determination of the Strengths of Streptococcal Toxins and Antitoxins.**—*Brit. J. Exp. Path.* **15.** 80-89. [Copied *verbatim* from *Bull. Hyg.* **9.** 493-494. Signed by C. C. Okell].

This paper contains a careful numerical study of the accuracy of scarlatinal toxin and antitoxin titration by means of toxin neutralization test on the skin of chinchilla rabbits. The major portion of the paper consists in an analysis of the results of tests by the usual statistical methods. The standard deviation in terms

of size of a streptococcal toxin reaction was calculated to be 2·493 mm. with a standard error of 0·696. Reactions produced by mixtures of toxin with an equal volume diluted antitoxin had more sharply defined margins than those produced by toxin mixed with an equal volume of saline, tetanus antitoxin, gelatin, agar or normal horse serum. In titrating streptococcal antitoxin a reduction of the size of the reaction is much more reliable as a guide to potency than complete neutralization. The results of the paper may be expressed practically as follows.

Assuming that two toxins are differentiated if correct distinctions could be made 95 times out of 100, it is possible to distinguish a 20 per cent. difference in toxin strength with a test involving 22 rabbits and two injections of each toxin into each animal. In antitoxin titration, using three injections of each antitoxin 11 animals are needed. Similarly four rabbits are required to distinguish a 50 per cent. difference in the strength of two toxins, and two rabbits suffice to distinguish a 50 per cent. difference in antitoxins.

KILDUFFE, R. A. (1933). **The Bachman Intradermal Reaction in Human Trichinosis.**—*Amer. J. Med. Sci.* **186.** 802-808. [Copied *verbatim* from *Trop. Dis. Bull.* **31.** 395-396. Signed by C. L.]

The author prefers eosinophilia to intradermal reaction in the diagnosis of trichinosis.

As the result of applying both tests to 33 persons exposed to infection it is concluded that examination for eosinophilia is technically simpler and always feasible, while the antigen is difficult to prepare and not always available ; in delicacy and constancy of appearance eosinophilia is a reliable index in man, so that the intradermal test has no practical advantages. The antigen used was supplied by SCHULTZ and obtained by passing isolated larvae many times through a Baermann apparatus, so that they were freed from foreign protein. The possibility of eosinophilia being due to quite other causes is not noted.

I. WITTE, J., & ZEYNELABIDIN. (1934). Ueber die Nachgeburtsreaktion für die Diagnose des infektiösen Abortus des Rindes. [**Serological Test with the Placenta in Contagious Abortion**].—*Deuts. tierärztl. Wschr.* **42.** 193-194. [8 refs.]

II. HOLTH, H. (1934). Ueber die Nachgeburtsreaktion für die Diagnose des infektiösen Abortus des Rindes. [**The After-Birth Reaction for the Diagnosis of Contagious Abortion**].—*Ibid.* 326.

III. WITTE, J. (1934). Ueber die Nachgeburtsreaktion für die Diagnose des infektiösen Abortus des Rindes. [**The After-Birth Reaction for the Diagnosis of Contagious Abortion**].—*Ibid.* 326-327.

I. The so-called placental reaction for the diagnosis of contagious abortion in cattle, first used by HOLTH in 1910, is a complement-fixation method in which known positive sera are used to detect the presence of homologous antigen in extracts of placental cotyledons.

After testing several methods, Witte and Zeynelabidin find that the best extracts are obtained by grinding the suspected cotyledons with saline in a mortar, allowing the thick suspension to stand for 24 hours in the cold, steaming on the water bath for five minutes and filtering through asbestos wool, after which 0·5 per cent. phenol is added.

Ninety-seven placentas were examined, of which 27 showed necrotic areas in the cotyledons. Microscopically 21 showed *Br. abortus*, four trichomonads, one *Mycobact. tuberculosis* and one diplococci.

Of the 21 which showed *Br. abortus* microscopically, 19 gave a positive

complement-fixation result whilst two were negative. None of the 70 placentas which showed no pathological change or of those infected with other organisms gave a positive result.

II. Holth, in a criticism of the work abstracted in I, states that the addition of phenol causes the extract to be anticomplementary and therefore diminishes the sensitivity of the test. He also maintains a preference for his own method [(1911). *Zschr. Infektkr. Haust.* **10.** 207].

III. Witte replies that no non-specific fixation of complement occurred even with large amounts of extract.—A. W. Stableforth.

Caminopetros, J. (1934). Une séro-floculation spécifique de la leishmaniose interne. Son utilité pour le diagnostic de l'infection et pour le contrôle du traitement. [**A Specific Sero-Flocculation in K. A. Its Value in Diagnosis and Treatment**].—*C. R. Soc. Biol. Paris.* **115.** 910-912. [Copied *verbatim* from *Trop. Dis. Bull.* **31.** 657-658. Signed by C. M. W.]

If to 2 c.c. of a 1 to 4 per cent. aqueous solution of sulfarsenol is added drop by drop serum of a case of kala azar it will be found that after the addition of the first drop a milky colour is produced. This increases in intensity and becomes a definite flocculation when 7 to 20 drops have been added. The addition of more drops after the maximum flocculation has been reached causes it to diminish and finally disappear.

With sera from healthy individuals or from those with diseases other than kala azar the slight flocculation which may be produced at the first drop has completely disappeared by the third or fifth. If to the solution of sulfarsenol to be used are added 3 or 4 drops of a serum which is known not to give the flocculation this will prevent the reaction with kala azar sera. The reaction appears very early in kala azar infections and does not disappear till a definite cure has resulted. The author claims that the test is more reliable than the antimony test.

I. Taliaferro, W. H., & Taliaferro, Lucy G. (1934). **Complement Fixation, Precipitin, Adhesion, Mercuric Chloride and Wasserman Tests in Equine Trypanosomiasis of Panama (Murrina).**—*J. Immunol.* **26.** 193-213. 10 tables. [18 refs.]

II. Cocksedge, T. A. B. (1934). **Notes on the Practice of Bennett's Test for Surra [*Tryp. evansi* Infection] in Camels Combined with the Use of Naganol.**—*J. Comp. Path. & Therap.* **47.** 64-66.

III. Packchanian, A. (1934). **Experimental Trypanosoma brucei Infection and Immunity in Various Species of Peromyscus (American Deer Mice).**—*Amer. J. Hyg.* **20.** 135-147. 1 table. [18 refs.]

I. This paper compares the results of thick blood film findings with the readings of the complement-fixation, precipitin, red blood cell adhesion and mercuric chloride tests in two studs of horses infected with *Tryp. hippicum*, one stud having been treated.

In the untreated stud there was a striking correlation of the test results. Out of 103 sera, 15 sera were from demonstrably affected animals, 12 sera were positive to all four tests and three were positive to three tests (two negative to mercuric chloride test and one to complement-fixation). Out of 88 sera from animals in which trypanosomes could not be detected, one serum was positive in all four tests, four in two tests and 30 were positive in one test. Fifty-three were negative in all four tests.

The second stud had been treated with "naganol" and "tryparsamide" and all animals had been negative to microscopic examination for three to 11

months, except for one animal found positive at the time of the investigation. Only very few sera were positive to any of the three specific tests whilst nearly half were positive to the mercuric chloride test. In both cases, positive results were recorded in approximately equal proportions in the group of previously affected animals and in those with no history of any infection.

The complement-fixation, precipitin and adhesion tests all appeared to be satisfactory in detecting untreated infected animals. Of the 88 microscopically negative animals, complement-fixation gave five positive readings, the precipitin test 20 positive readings, and the adhesion test 11 positive readings.

Antigens for the complement-fixation and the precipitin tests were prepared by Watson's method from strains of *T. equiperdum* and *T. hippicum*, whilst in the adhesion tests equine red cells were used.

II. This paper describes the progress of the measures taken to deal with trypanosomiasis of camels in Somaliland. On a systematic testing of the camels of the Somaliland Camel Corps by the mercuric chloride test, 16 per cent. of animals gave positive reactions. After injections of "naganol", microscopic examination of the blood was made every two hours, and from this it appeared that the trypanosomes began to degenerate in six hours and disappeared, as a rule, before the 15th hour; they could never be demonstrated after 48 hours. At the commencement, a dose of 10 g. "naganol" was used, but the dose was gradually reduced to 3 g. by the beginning of 1932. Up to the end of 1933 no relapses had been detected. Somali camel owners, hearing of the good results, asked for treatment on payment and for two years native assistants have been employed treating infected native-owned animals with "naganol."

III. This paper records that in four species of *Peromyscus*, *T. brucei* causes an acute infection with death within ten days, whilst in *P. maniculatus* it causes a chronic fatal infection with an average life of 80 days. *P. leucopus noveboracensis* exhibited a high resistance with a recovery rate of 50 per cent. The blood of recovered animals was no longer infective for rats, though in one case, although the entire heart blood failed to infect a rat, an emulsion of organs, bone-marrow and glands infected a rabbit. Re-inoculation of recovered animals caused a mild second infection. This process has been repeated four times and is considered to have produced a relative immunity.—U. F. Richardson.

Meinicke, E. (1934). Eine neue Serumreaktion auf Tuberkulose. III. Mitteilung. [**A New Serum Reaction for Tuberculosis**].—*Klin. Wschr.* **13.** 833-838. [Copied *verbatim* from *Bull. Hyg.* **9.** 640. Signed by G. S. Wilson].

A flocculation reaction is described which the author regards as being specific for tuberculosis. Four different antigens are employed, and the test can be performed in three different ways. Its main use would appear to be in differential diagnosis, but it can also be used for prognosis, provided repeated tests are made.

Taylor, G. L., Adair, G. S., & Adair, Muriel E. (1934). **The Precipitation Reaction. Optimal Proportions, Neutrality and Maximal Precipitation in Mixtures of Albumin and Antiserum.**—*J. Hyg. Cambridge.* **34.** 118-130. 1 fig. [13 refs.] [Copied *verbatim* from *Bull. Hyg.* **9.** 489. Signed by W. W. C. Topley].

By examining the supernatant fluid for antigen and antibody, and by determining the nitrogen content of the antigen and of the precipitate, the authors have attempted to determine the distribution of the reagents in precipitating antigen-antibody mixtures in which the proportion of the two reagents was varied. The

first system studied consisted of purified egg-albumin as antigen and antisera prepared by the immunization of rabbits.

In titrations carried out by the Dean and Webb method, in which the amount of antiserum is held constant and the amount of antigen is varied, it was found that the mixture giving optimal (most rapid) flocculation was that in which neither antigen nor antibody could be demonstrated in the supernatant fluid. In the regions of antigen or antibody excess, to either side of the optimal tube, the reagent in excess could be demonstrated in the supernatant fluid. In conformity with the previous experience of the author, and with that of other workers, it was found that the maximum precipitate was given, not by the optimal mixture, but by a mixture in the region of antigen excess ; further increase in the proportion of antigen gave a smaller final precipitate as well as a further slowing of the reaction. The nitrogen figures obtained did not support the view, put forward by CULBERTSON and by others, that in the region of varying antibody excess the proportions of antigen and antibody in the precipitate were constant. To quote one illustrative protocol, a particular serum gave optimal flocculation (constant-antibody) when 1 part by volume of a 1 per cent. solution of egg-albumin was mixed with 23·5 parts of the antiserum. In this tube the ratio of precipitate nitrogen to antigen nitrogen was 13·3 : 1. When the amount of antigen was halved the ratio of precipitate nitrogen to antigen nitrogen rose to 18·3 : 1 indicating that more antibody had combined with the antigen.

When the titration was performed according to the Ramon technique, by holding the amount of antigen constant and varying the amount of antiserum, optimal flocculation was given by a mixture containing proportionately 1·6 times as much antiserum as that present at the constant-antibody optimum. Tests on the supernatant of the constant-antigen optimal tube always revealed the presence of antibody excess. The amount of precipitate increased with increase in antiserum beyond the optimal tube. In this series of experiments the tube with the greatest amount of antiserum always gave the greatest weight of precipitate, even in the zone of delayed flocculation. Here again the nitrogen figures indicated the combination of antigen and antibody in varying proportions.

Experiments in which crystalline horse-serum albumin was tested against homologous rabbit antiserum gave less satisfactory results, since both antigen and antibody were demonstrable in the supernatants over a relatively broad zone.

PEDERSEN-BJERGAARD, K. (1934). Untersuchungen ueber die Antigene des Tuberkelbazillus. [**Fractionation of the Tubercle Bacillus**].—*Zschr. Immun.-forsch.* **82.** 258-286. [14 refs.] [Copied *verbatim* from *Bull. Hyg.* **9.** 642. Signed by G. S. WILSON].

A virulent human strain of tubercle bacillus, H37, was grown on Long's synthetic medium for 6 weeks at 37°C. The cultures were then filtered, and the bacilli extracted with lipoid solvents according to Anderson's technique. The lipoid material was fractionated into three portions – phosphatides, glycerides, and waxes. A study was then made of the ability of the various fractions to stimulate the production of antibodies in rabbits and to fix complement *in vitro*.

The general results showed that the lipoid-free tubercle bacilli containing the protein fractions, and the three phosphatide fractions separated by further extraction, were each true antigens. The acetone-soluble glyceride fraction, on the other hand, was incapable either of stimulating the production of antibodies or of reacting with antibodies *in vitro*.

RAISTRICK, H., & TOPLEY, W. W. C. (1934). **Immunizing Fractions Isolated from *Bact. aertrycke*.**—*Brit. J. Exp. Path.* **15.** 113-130. 7 tables. [32 refs.]

DELAFIELD, M. E. (1934). **Blood-Sugar Changes and Toxic Effects Produced in Rabbits by Certain Fractions Derived from *Bact. aertrycke*.**—*Ibid.* 130-137. 4 tables. [10 refs.]

MARTIN, A. R. (1934). **The Toxicity for Mice of Certain Fractions Isolated from *Bact. aertrycke*.**—*Ibid.* 137-142. 2 tables. [7 refs.]

These three papers are concerned with the immunizing and toxic activities of various fractions isolated from *Bact. aertrycke*. The first paper deals with the isolation by chemical methods of fractions from *Bact. aertrycke* that contain specific somatic polysaccharides in an antigenically active form in the absence of any intact protein. The fractions are toxic and efficient immunizing agents when tested on mice, inducing an active antibacterial and antitoxic immunity. Specific precipitating and agglutinating antibodies were produced in rabbits by intravenous injection. The fractions were obtained first by digesting and then by precipitating with the addition of 68 per cent. alcohol. They are not chemically pure substances and differ from the bacterial polysaccharides, having the characters of haptens in the sense defined by LANDSTEINER. These latter react specifically in the test tube with antisera prepared by injection of the corresponding bacterial cells, but are not actively antigenic when injected into the animal tissues. The authors hope ultimately to purify and identify the active fractions and thereby gain an added precision in experimental work and, perhaps, in practical prophylaxis.

The second paper deals with the effect in rabbits of the fractions derived from *Bact. aertrycke*. It is shown that they are active in producing hyperglycaemia and toxic effects, and the toxicity of the various fractions tested runs closely parallel to their ability to induce antibacterial and antitoxic immunity in mice. The fractions were derived from the bodies of *Bact. aertrycke* by tryptic digestion followed by alcohol precipitation, and the active fractions are all precipitable within the range of 50 to 68 per cent. by weight of alcohol concentration. Immunity to the chemical response can be developed by a series of injections of the most active alcohol fraction.

The third paper concerns the toxicity for mice of the fractions isolated. The toxic substance for mice was found to be contained in the same fractions as those which induce the active antibacterial immunity in mice as outlined in the first paper.—R. LOVELL.

HEDSTRÖM, A. (1934). Paratyfusvaccinens immuniserande förmåga. [**Value of Paratyphoid Vaccine**].—*Skand. Vet.-tidskr.* **24.** 227-244. 24 figs., 4 tables. [English summary : abst. from orig.]

This article describes experiments on mice with a dead vaccine, prepared from a paratyphoid strain isolated from a pig that died in an outbreak that has been previously described [this *Bull.* **4.** 461]. The disease in the pigs ran an acute course : it had not the typical appearance of necrotic enteritis and the bacteriological diagnosis was only pursued far enough to place the organisms isolated in the paratyphoid group.

The immunity conferred on the mice was only transient. Most of the test animals had lost their immunity 16 weeks after treatment.—J. E.

ZAGRODZKI, K. (1933). Anatoksyna przeciwtezcowa i jej zastosowanie w medycynie weterynaryjnej. [**Use of Tetanus Anatoxin in Veterinary Medicine**]. —*Wiadom. Wet.* **12.** 409-427. [21 refs.] [French summary : abst. from orig.]

Ramon's experiments with tetanus anatoxin mixed with tapioca are discussed at length. The author confirms the general findings of earlier workers and describes the technique for producing anatoxin and how it should be used. Two subcutaneous injections of 10 c.c. anatoxin with 1 per cent. of tapioca added are able to confer in a horse, eight to ten days after the second injection, an immunity lasting for several months. There must be an interval of one month between the first and the second injections. Permanent immunity can be obtained by the third injection of the same quantity of tapioca anatoxin 12 months after the second injection.—K. Szczudlowski (Lwów).

Mackie, T. J., van Rooyen, C. E., & Finkelstein, M. H. (1934). **Observations on the Bactericidal Properties of Leucocytes and Blood-Platelets with Particular Reference to their Action in the Presence of Normal Serum.**—*J. Path. & Bact.* **39.** 89-112. 13 tables. [21 refs.]

The authors have previously shown [this *Bull.* **3.** 632.] that the bactericidal action of whole blood or of serum-leucocyte suspensions is dependent upon (a) the bactericidal action of the serum ; (b) the bactericidal action of the leucocytes, and (c) an " enhanced " bactericidal effect which is quantitatively in excess of the sum of these properties and which may occur in the absence of any independent action by serum or leucocytes.

Using the same basal methods they now show that the action of the leucocytes occurs in the absence of phagocytosis, e.g. after the leucocytes have been heated at 45°C. or treated with a leucocidal toxin. These properties depend upon an extractable product of the cells and the " enhanced " effect is a function of the mutual action of this product and a serum principle ; this leucocyte substance is liberated under the conditions of the bactericidal experiment but may possibly act intracellularly on phagocyted bacteria.

Blood platelets, like leucocytes, may exhibit bactericidal action *per se* and an " enhanced " effect in the presence of serum, and their action also depends upon an extractable substance with properties similar to that of leucocytes. Treatment of leucocytes with a leucocidal toxin may increase their bactericidal activity *per se* or when used with serum, probably by increased liberation of their active substance. The serum principle which is mutually active with leucocytes or platelets is thermostable up to 63°C. The active substance of the leucocytes and platelets of the ox and horse is labile at 50°C., but that of rabbit leucocytes remains active at 55° or even 60°C. More than one cell substance may be concerned, for the substance reacting with Gram-negative bacteria is less easily extractable than that for Gram-positive bacteria. The mutually active principles of serum and cells cannot be identified with the β lysin of Pettersson [this *Bull.* **3.** 144.] or a component of this. The " enhanced " effect may be absent, being dependent upon a suitable proportion of the active principles concerned.—A. W. Stableforth.

Gordon, J., & Knox, J. C. (1934). **The Bactericidal Properties of Adrenal Extracts.**—*J. Path. & Bact.* **38.** 493-498. [Copied *verbatim* from *Bull. Hyg.* **9.** 554. Signed by W. W. C. Topley].

The authors have tested the bactericidal action of adrenal extracts on a variety of bacteria. Bovine adrenal glands were minced, ground with sand, and extracted with water for 2 hours at 65°C. in an open bowl, 200 cc. of water being used for 100 gm. of minced tissue. Under such conditions the extract deepened in colour until it became quite dark, with a greenish tinge. The extract was centrifuged, and the supernatant fluid was passed through a Maassen candle and adjusted to pH 7·6. The extract was tested by adding 10 cc., 5 cc. and 2·5 cc. to 30 cc.,

35 cc. and 37·5 cc. respectively of peptone-broth-agar. Plates were poured, 10 cc. per plate, and inoculated with light suspensions of the organisms to be tested. The results were, in many respects, similar to those recorded in the much less detailed studies of certain earlier workers. The extract was found to have a very active bactericidal action on *C. diphtheriae* and on *V. cholerae*, it was slightly less active against *B. anthracis*, *Staph. aureus* and *C. hofmannii*, somewhat less active still against *Bact. paratyphosum A*, *Bact. enteritidis*, *Bact. typhosum*, *Bact. dysenteriae* (Flexner) and *Bact. friedlanderi*, only slightly active against *Bact. coli*, *Bact. paratyphosum B* and *Ps. pyocyanea*, and almost inactive against *B. subtilis*, *Chr. prodigiosum*, a streptococcus, a pneumococcus and an enterococcus. The presence of blood or serum in the medium abolished or greatly reduced the bactericidal action. When separate extracts were prepared from the cortex and medulla, the bactericidal substance was found to be confined to the medullary extract. Adrenalin was found to have a bactericidal action similar in type to that of the medullary extract, but less in degree.

I. Sédallian, P., & Clavel, J. (1934). Séparation de l'agglutinine et du pouvoir antisepticémique du sérum antistreptococcique par la dissociation du complexe anticorps-bactérie. [**Separation of Agglutinin and Antiseptic-caemic Property of Antistreptococcal Serum by Dissociation of the Coccus-Antibody Complex**].—*C. R. Soc. Biol. Paris.* **115.** 60-61.

II. Sédallian, P., & Clavel, J. (1934). Technique utilisée pour dissocier les complexes streptocoques-anticorps spécifiques. [**Technique Utilised for the Dissociation of the Specific Coccus-Antibody Complexes**].—*Ibid.* 61-63. [Copied *verbatim* from *Bull. Hyg.* **9.** 417. Signed by C. C. Okell].

I. Antistreptococcal serum, previously titrated as regards its agglutinating and antisepticaemic powers is exposed in suitable dilution to the action of a suspension of the corresponding strain of streptococcus. The bacteria are centrifuged, and washed three times in saline so that all traces of serum proteins are removed. The cocci are then resuspended in distilled water to which one or two drops of HCl are added. After 24 hours the cocci are again spun down and the supernatant liquid is often found to contain more than 50 per cent. of the original agglutinating and antisepticaemic power of the original serum. The resulting fluid gave no precipitate with nitric acid.

II. Certain technical difficulties arising out of the above work are discussed, particularly the difficulties met with in attempting to separate the agglutinins from the other specific properties of the serum.

Hupbauer, A., & Lugomer, V. (1934). Da li mozemo nespecifičkim podrazajem pojačati proizvodnju antitijela? [**Increase in Antibody Formation by Non-Specific Stimulation Therapy**].—*Vet. Arhiv.* **4.** 196-263. 54 figs., 4 tables. [10 refs.] [Abst. from German summary].

The authors carried out experiments on hyperimmunized rabbits and horses to find out whether injections of manganese chloride could cause an increase in antibody formation. The results were, however, negative. *Erysipelothrix rhusiopathiae* [swine erysipelas bacillus] was used.—J. E.

Landsteiner, K., & van der Scheer, J. (1934). **Serological Studies on Azoproteins. Antigens Containing Azocomponents with Aliphatic Side Chains.**—*J. Exp. Med.* **59.** 751-768. [14 refs.] [Copied *verbatim* from *Bull. Hyg.* **9.** 638. Signed by W. W. C. Topley].

The authors record the immunological reactions of a number of aliphatic

acids and a few related compounds. In the preparation of antigens for immunization or for the test-tube reactions, the acids were coupled to protein by preparing amino-phenyl derivatives of the type $NH_2 \cdot C_6H_4 \cdot (CH_2)_nCOOH$, or, in the case of dibasic acids, aminoanilic acids of the type $NH_2 \cdot C_6H_4 \cdot NHCO.(CH_2)_nCOOH$. In either case these derivatives were coupled to proteins by the diazo-reaction. For purposes of immunization the acids were coupled to horse-serum globulin. Since certain of the substances tested gave insoluble compounds when coupled to globulin the antigens employed in the test reactions were prepared with casein.

The reactions obtained showed definite, though not absolute, specificity. For instance, a *p*-aminophenylacetic acid antiserum gave well-marked precipitation with the homologous antigen, slight precipitation with a *p*-aminophenylbutyric acid antigen, and no precipitation with *p*-aminobenzoic acid or *p*-aminophenylcaproic acid antigen. The reactions with antisera prepared against long-chain aliphatic antigens were less sharply specific. Thus a *p*-aminophenylcaproic acid antiserum gave marked precipitation with the homologous antigen, a rather less marked reaction with a *p*-aminophenylbutyric acid antigen, a slight but quite definite reaction with a *p*-aminophenylacetic acid antigen, and a very faint reaction with a *p*-aminobenzoic acid antigen. Again, sera prepared against *p*-aminooxanilic acid and *p*-aminosuccinanilic acid gave far more specific reactions than sera prepared against *p*-aminoadipanilic acid and *p*-aminosuberanilic acid.

Inhibition tests, in which the aminoanilic acids were employed, confirmed the precipitation tests carried out with these acids coupled to casein. In higher concentrations the dibasic acids themselves gave typical inhibition reactions, and it is noted that, by this method, succinic acid could easily be differentiated from malonic or adipic acid. It is noted also that the reaction between succinic acid antisera and azoproteins was inhibited by succinic, maleic and citraconic acids, the two latter being cis compounds, whereas it was not inhibited by the corresponding trans compounds, fumaric and mesaconic acids. It would seem to follow that the cis-trans isomerism is immunologically as significant as is the isomerism that depends on asymmetric carbon atoms.

DISEASES, GENERAL.

I. —. (1934). **Report of Committee [U.S. Livestock Sanit. Ass.] on Transmissible Diseases of Swine.**—*J. Amer. Vet. Med. Ass.* **84.** 431-433.

II. Benner, J. W. (1934). **Some Swine Diseases and Attempts at Control.**—*Ibid.* 609-619. [7 refs.]

I. The committee reviews some important points in disease control which it had dealt with in previous years. There is evidence that swine erysipelas [*Erysipelothrix rhusiopathiae* infection] was not so prevalent during the period under review as in previous years, but apparently it is spreading as it has been reported from some new areas.

Laboratory investigations have shown that both the rapid-plate and the tube-agglutination tests are of considerable value in diagnosing the disease. Positive agglutination reactions occur early in the acute stage of the disease and also in the chronic stage in which there is arthritis.

The committee reiterates that hog cholera [swine fever] remains the pig disease of greatest economic importance in America. It advocates further study of the methods by which the virus is disseminated and of differential diagnosis.

II. Benner criticizes the insanitary conditions prevailing on some American pig farms. He considers that anaemia in young pigs can be satisfactorily controlled

by having an earth floor in part of the farrowing pen or by providing a supply of earth for the pigs from which they can obtain the necessary iron and copper.

—T. M. Doyle.

Lloyd, D. C. (1934). **Preliminary Note on Grass Disease Investigation in South-West Wales.**—*Welsh J. Agric.* **10.** 317-319.

The author states that in Wales grass sickness of horses is limited to the south-west, is confined almost exclusively to the south of the river Teifi and is most prevalent in the St. Dogmells, Molygrove and Eglwyswrw districts [County Pembroke]. Since 1928 it has spread into Carmarthenshire.

It has been noticed that the areas of maximum incidence of grass sickness coincide with areas with a heavy incidence of the springtail (*Sminthurus viridis*), and the author is making a survey of the relationship of this insect to the problem.

—J. E.

Wesche, G. (1933). Zur Frage der Bekämpfung des gelben Galtes durch kohlehydratreiche Nahrung, unter besonderer Berücksichtigung der Veröffentlichung von Fr. Wiedmann : " Mastitis und Kohlehydratmangel". [**Control of Mastitis by Carbohydrate-Rich Food**].—*Tierärztl. Rdsch.* **39.** 478-481 and 491-493. 1 table. [24 refs.]

The author has been unable to confirm the claims of Wiedmann [this *Bull.* **4.** 6.] that mastitis is a deficiency disease produced by lack of carbohydrates in the diet, or that the changes produced in the milk can be cured by increased carbohydrate feeding.

Observations were made on 13 cows which belonged to three herds and which were all affected with severe streptococcus mastitis. Nine of these animals were given rations containing a high proportion of carbohydrate for five to six weeks, while the remainder were given the customary ration. Quarter samples were examined weekly.—A. W. Stableforth.

I. Harbou, J. (1934). Perinaeal og mammaer Botryomykose ved Parringssmitte hos Hopper. [**Transmission of Perineal and Mammary Botryomycosis to Mares at Mating**].—*Maanedsskr. Dyrl.* 497-502.

II. Plum, N. (1934). Om enzootisk Optraeden af Svulster i Naesehulen hos Hest og Kvaeg. [**An Outbreak of Nasal Tumours in Horses and Cattle**].—*Ibid.* 620-632. 2 figs. [8 refs.]

I. During three days 11 mares were taken to a Jutish stallion. Two of them, which were covered for the first time, developed purulent vaginitis and perivaginitis about ten days later. In the course of the following weeks abscesses developed in the perineum, gradually extending towards the udder and penetrating the skin. The diagnosis of botryomycosis has not yet been verified bacteriologically. The infection is supposed to have occurred through lesions of the vagina. Treatment with iodine and " yatren " had favourable results.

II. This article contains a survey of an enzootic of tumours in the nasal cavity that were first described by Stenström in Sweden. This is followed by a description of a cow with periosteal sarcoma originating from the posterior part of the nasal cavity. The cow came from a herd of six cows in which a case of blood-stained nasal discharge with nasal stenosis occurred during three successive years. The duration of the illness was from two to three months and the animals had to be killed. No *post-mortem* examinations were carried out.

—H. C. Bendixen (Copenhagen).

I. Dobberstein, J., & Paarmann, E. (1934). Die sogen. Lymphadenose des Rindes (Rinderleukose). [**So-Called Lymphadenosis in Cattle (Leucosis of Cattle)**].—*Zschr. Infektkr. Haust.* **46.** 65-109. 4 figs., 4 plates, 3 tables. [105 refs.]

II. Dobberstein, J. (1934). Betrachtungen über die Lymphadenose des Rindes (Rinderleukose). [**Bovine Lymphadenosis**].—*Deuts. tierärztl. Wschr.* **42.** 289-293. 4 figs. [23 refs.]

III. Salomon, S. (1934). Leukämische Lymphadenose beim Kalbe. [**Leucaemic Lymphadenosis in the Calf**]. —*Zschr. Fleisch- u. Milchhyg.* **44.** 342-343. 1 fig.

IV. Dobberstein, J., & Piening, C. (1934). Ueber eine übertragbare Anämie des Rindes und ihre Beziehungen zur Rinderleukose. [**A Transmissible Bovine Anaemia and Its Relation to Leucosis**].—*Berl. tierärztl. Wschr.* **50.** 449-452. 2 tables, 3 graphs. [17 refs.]

I. Twenty-one cases of bovine lymphadenosis have been studied, and extensive references are made to the findings of other workers. The blood picture may sometimes show a rise in the total leucocyte count. A few authors describe a 20 to 30 per cent. rise in the lymphocyte count, whilst others have failed to demonstrate a significant rise. It is generally agreed that there is a slight but unmistakable rise in the monocyte count. It is concluded that lymphadenosis generally occurs as an aleucaemia [i.e. a hyperplastic condition of the lymphoid tissue without any outstanding change in the blood picture].

Post mortem there is marked enlargement of lymphatic glands ; nodules consisting of aggregations of lymphoid tissue are found in serous and mucous membranes, the heart muscle, skeletal muscle, kidneys, suprarenal glands, pancreas, udder and central nervous system. The liver may or may not show enlargement and the presence of such foci. The spleen may be almost unchanged or may show enlargement. Microscopically, the nodules consist of aggregations of lymphoid cells differing slightly from true lymphocytes in the appearance of the nucleus.

The author considers that the condition should be called cattle leucosis.

II. This article covers the same ground as the foregoing.

III. *Post-mortem* findings, similar to those described in I, are recorded.

IV. Four bovines, apparently healthy, but showing on examination anaemic or leucaemic conditions of the blood, were bled and the resulting fluid was subsequently inoculated into three healthy cattle. These animals developed fever and anaemia in about seven days, and took from two to three months to regain their normal health. The authors merely state experimental evidence and do not discuss the possible causes of this phenomenon.—E. J. Pullinger.

Soetisno, M. (1934). Keratitis Infectiosa bij runderen. [**Infectious Keratitis of Cattle**].—*Ned.-Indisch. Blad. Diergeneesk.* **46.** 27-36. 2 tables. [5 refs.] [English and German summaries : abst. from orig.]

This is the first report on infectious keratitis of cattle in Sumatra. A herd of 81 cows became affected ; in 15 of them a superficial corneal abscess formed and burst outwardly in all but one case, which burst inwardly. Recovery was usually complete in 35 days. The keeping of the animals in darkness and the application of a zinc sulphate lotion to the eyes were useful prophylactic and curative measures.

Laboratory methods of diagnosis did not demonstrate any particular micro-organism as the cause.—J. van der Hoeden (Utrecht).

Wester, J. (1934). Hydrocephalus internus. [**Cerebral Dropsy**].—*Tijdschr. Diergeneesk.* **61.** 1-14. 5 figs. on 3 plates. [8 refs.] [English and German summaries : abst. from orig.]

The author first gives a short review of the structure and the physiological conditions of the cerebral cavities, as far as these are of importance in the genesis of hydrocephalus in animals. He discusses chronic internal and acute internal and external hydrocephalus, in the horse, ox, pig, sheep and goat. He states that the cerebrospinal fluid is considered to be lymph, which has been drained from the cerebrum along the sheaths of the blood vessels and has been resorbed by the choroid plexus. In animals outlets have never been detected. Contrary to the case in man, the normal position of the head in animals is such that there is no natural backward drainage. Wester has noted the appearance of hydrocephalus in animals after encephalitis or meningitis ; tumours hardly play any part.

Hydrocephalus by itself never causes symptoms of disease in animals ; the depression observed in clinical cases must be the result of lesions of the brain tissue such as inflammation or intoxication.—J. VAN DER HOEDEN (UTRECHT).

I. ALLCROFT, W. M., & GODDEN, W. (1934). **Changes in the Calcium and Magnesium of the Serum and in the Inorganic Phosphorus of the Blood of Cows at Calving and of the Calf during Early Life.**—*Biochem. J.* **28.** 1004-1007. 2 figs., 2 tables. [5 refs.]

II. SZEPESHELYI, A. (1934). Das Blutbild der Rinder und der Hunde während der Trächtigkeit, bei der Geburt und bei Erkrankungen der Geschlechtsorgane. [**Blood Picture of Cattle and Dogs during Pregnancy, at Parturition and in Genital Diseases**].—*Berl. tierärztl. Wschr.* **50.** 373-374. [6 refs.]

I. A slight decrease was found in the serum-Ca and blood-inorganic P of cows immediately before and at parturition. During the period under experiment the serum-Mg fluctuated very erratically, but tended to rise very slightly within 24 hours of parturition. Values obtained for the first eight weeks of life of eight calves showed that they had higher levels of serum-Ca and blood-inorganic P than the normals of their dam, but the serum-Mg level, though lower at birth, attained the value of the dam's normal within three weeks. From their results as a whole, the authors concluded that serum-Mg seemed to vary inversely with serum-Ca.

II. Since the leucocytosis of parturition only occurs during the last few days of pregnancy, the author asserts that pregnancy could not be diagnosed by any change in the blood picture. He contends, however, that under certain conditions, changes in the blood counts were very valuable in the diagnosis of pyometra and endometritis, especially if no other pyogenic infection were present. These changes were also useful in the prognosis of difficult labour, forceps deliveries, and caesarean operations.—JAMES STEWART.

FRIEDEMANN, U., & ELKELES, A. (1933). **Studies on the Aetiology of Blood Diseases. A Pathogenic Agent in Normal Human Bone Marrow.**—*Brit. Med. J.* Dec. 16th. 1110-1112. [6 refs.]

This is an *interim* report on the authors' investigations on the aetiology of pernicious anaemia and acute leucaemia. Rabbits, weighing from 2,500 to 3,000 g., were inoculated intrathecally with bone-marrow and blood from human cases of the diseases. The blood gave uniformly negative results.

The bone-marrow was suspended in saline and 0·3 c.c. injected through the occipito-atlantal membrane into the theca. Data are given only of those cases in which the inocula were subsequently proved to be sterile.

After the injection of rabbits with human bone-marrow, characteristic symptoms developed after an incubation period of a few days to three weeks. The first symptom was usually paresis of the hind legs, although in a few instances the

initial symptom was a spasmodic contraction of the muscles of the neck. In some rabbits the symptoms progressed and ended in death; in others they remained stationary, or even disappeared.

It was found that the encephalitis produced in rabbits could be passaged serially to other rabbits.

Further investigations showed that an identical train of symptoms could be induced in rabbits by the injection of normal human bone-marrow, but this encephalitis was not apparently capable of serial transmission to other rabbits.

Similar injections into rabbits of suspensions of bone-marrow, liver and spleen of normal rabbits, and the bone-marrow of normal guinea pigs, gave negative results. Details are given of the histological findings in the livers of rabbits injected with human bone-marrow.

The authors conclude that there is an agent in normal human bone-marrow pathogenic for rabbits, but whether or not this is a living agent remains to be determined.

A further discussion of the problem is promised in a future paper.

—T. M. Doyle.

Friedemann, U. (1934). **The Pathogenic Agent in Normal Human Bone Marrow.** —*Brit. Med. J.* March 24th. 517-519. [6 refs.]

The author has previously shown [above] that the intrathecal inoculation of normal human bone-marrow into rabbits induced a fatal paralysis which was not usually transmissible. Further investigation has shown that this agent is present in human spleen and leucocytes, but not in the corresponding tissues from lower animals (rabbits, guinea pigs, cats and horses). It resists treatment which would certainly destroy a virus and appears to be closely allied with a proteolytic ferment previously described by Jochmann. It is suggested that it does not differ materially from the agent discovered by Gordon in glands from cases of human lymphadenoma.—R. E. Glover.

PUBLIC HEALTH.

I. Hardenbergh, J. G. (1934). **Some Essentials in Quality Milk Production.** —*J. Amer. Vet. Med. Ass.* **84.** 384-388.

II. Taylor, H. (1934). **Note on the Effect of Drinking Water Contaminated with Sewage, on the Milk.**—*Vet. J.* **90.** 281-282.

I. This report states that methods of milk production for commercial distribution were formerly primitive and most insanitary, but that during the past four decades the dairy industry has made greater strides in the United States of America than in most other countries. From the successful application of the tuberculin test during the past 16 years, the author considers that the disappearance of a serious bovine disease can now be visualized.

By pasteurization, general market milk supplies for the consuming public can be rendered safe and it may soon be time to consider that, (a) the tuberculin testing of dairy cattle, (b) the pasteurization of market milk, and (c) the production of certified milk, have reached or are rapidly reaching the peak of their development with respect to the milk situation in general. The wide gap which previously existed between certified milks and the lower grades has been appreciably narrowed. For the production of quality milk certain essentials are required, i.e., (1) economic dairy herd units, (2) a system of technical control, and (3) application of research to the improvements in milk quality. As regards (1), this means that the herd

should be sufficiently large to warrant the institution of modern equipment in the dairy and cows should not be kept as a sideline, but the herd should be sufficiently large to meet competitive quality requirements. Technical control, (2), comprises medical supervision of the health status of all milk handlers, veterinary supervision of the herd and the control of tuberculosis and *Br. abortus* infection, as well as the control of the cattle food so as to maintain nutritional standards.

The author believes that, in breeding dairy animals for quality milk production, a healthy pedigree is of far greater importance than the blood lines.

II. The author points out that there are two schools in the veterinary profession, holding conflicting views as regards the influence of sewage water when ingested by cattle. He gives the following two cases :–

(1) A farmer whose cows gave clotted milk. Individual groups varied in degrees of abnormality, the milk being thick, ropy and of a muddy colour. The water supply was found to be contaminated from household sinks and this was considered to be the cause. When the sink discharge was not allowed to gain access to the cows' water supply, the milk became normal.

(2) In this case the milk was ropy and on examination the pond water was found to have become discoloured recently. When this source of water supply for the cows was discontinued, their milk became normal. On further examination it was found that sewage was gaining access to the water supply.

It is important, for the production of pure milk supply, not to overlook the provision of a pure water supply for the cows.—Brennan de Vine.

American Pub. Health Ass. Year Book. (1933-34). (Supp. Amer. J. Pub. Health. 1934, v. **24**, Feb.), 67-71. [10 refs.] **Resistance of Streptococci to Pasteurization.** [Rept. of Cttee. on Milk Pasteurization Studies presented to the A.P.H A at the 62nd Ann. Meeting, Breed, R. S., Chairman]. [Copied *verbatim* from *Bull. Hyg.* **9**, 337. Signed by W. G. Savage].

A summary of various researches upon pasteurization temperatures and times upon various streptococci. While pathogenic streptococci are said to be destroyed investigations are cited that various streptococci, such as *Streptococcus thermophilus*, and possibly others, may survive 165°F. for 15 minutes. One author is quoted that some mastitis streptococci may survive 145°F. for 30 minutes in small numbers. The Committee suggests that further investigations are required as to the thermal death points of the different types.

I. Cunningham, A., & Andrews, A. (1933). **The Burri Smear-Culture Method for the Determination of the Bacterial Content of Milk Samples.**—*J. Dairy Res.* **5**, 29-41. 5 tables. [10 refs.]

II. Bogdanoff, W. M. (1934). Une nouvelle méthode de numération directe des microbes du lait. **[A New Way of Counting Bacteria in Milk].**—*Le Lait.* **14**, 37-48. 4 tables.

I. Burri (1928) described a method for enumerating bacteria in suspensions – growth of inocula from measured dilutions on agar. The method which is described and discussed is claimed to be both easy and efficient. An investigation was carried out to compare the accuracy of this method as compared with the ordinary pipette-plate technique. The investigation showed that the usual method of plating is more accurate than that of Burri. The simplicity of the smear is, however, a point in its favour.

II. A new method of counting bacteria in milk is described and considered. It appears, however, that whilst this method is of considerable interest, and may be used with advantage in conjunction with the more usual methods, no significant advantages can be claimed from its use alone.—L. Jordan.

Bibby's Book on Milk. (1933). **Section I. (Second Edition) Being a Scientific Study of Some of the Many Problems Connected with Milk ; its Production and Distribution.** pp. 55. 24 figs. Liverpool : J. Bibby & Sons, Ltd. [7s. 6d.] [Copied *verbatim* from *Bull. Hyg.* **9.** 336. Signed by W. G. Savage].

This small brochure deals entirely with chemical problems and is a more or less popular account of factors which have to be taken into consideration in chemical analyses and in relation to legal proceedings. A good deal of attention is paid to variation in the chemical composition of milk as regards fat and solids not fat, a considerable part of the space being devoted to the rather elementary problems of inadequate mixing. A few scientific matters are discussed such as the freezing point test, the nitrate test for added water and the colour of milk. A number of pages are devoted to the existing milk standards as regards presumption of adulteration. The brochure is written essentially from this legal standpoint, all the matter discussed being really in relation to the value of analytical evidences and the possibilities of error from the various factors discussed. As such it discusses considerations frequently omitted in text books.

I. Geiger, J. C., & Gray, J. P. (1933). **Food Poisoning.**—*J. Amer. Med. Ass.* **101.** 975-979.

II. —. (1934). **Food Poisoning.**—*Brit. Med. J.* April 14th. 677-678. [1 ref.]

I. According to the authors, food poisoning should be limited in its definition to describe that clinical syndrome resulting from the ingestion of food contaminated with certain bacteria. They mention two kinds, (a) botulism and (b) food poisoning *per se* – infection with the paratyphoid-enteritidis group traceable to human or animal carriers.

In two outbreaks investigated by the Health Department of the City of San Francisco, infection from animal sources was traced. The first case occurred in a labour camp, where 17 out of 41 men were affected, and was due to *Bact. enteritidis* in some roast beef. Raw meat from the hind quarter was not infected. *Bact. enteritidis* was isolated at an autopsy on the one death that occurred. In the second case ten people were affected after eating lunch at a café. *Bact. paratyphosum* B was isolated from sauce and some turkey meat and an organism with similar cultural characters was also isolated from the stools of one employee.

Emphasis is laid on proper methods of investigation. A comparison is made between the procedure adopted in outbreaks in other American cities and it is recommended that control be exercised by (a) supervision of food handlers, (b) food inspection service and (c) health education.

II. Referring to the comments of Geiger and Gray in their articles on food poisoning, the editor of the *Brit. Med. J.* does not consider that a sufficient case is made out for confining the name " food poisoning," to botulism and infection with the paratyphoid group. The condition called " food poisoning " covers a wider field, and it is felt that confusion would arise if the name were confined as suggested by the two American authors.—D. J. Anthony.

I. Baars, G. (1934). Ueber bakteriologische Fleisch- und damit zusammenhängende Untersuchungen. [**Bacteriological Meat Inspection**].—*Deuts. tierärztl. Wschr.* **42.** 358-361. 2 tables. [7 refs.]

II. Schönberg, F. (1934). Zum Wert des Mallachitgrünagars für die bakteriologische Fleischuntersuchung. [**The Value of Malachite Green Agar for Bacteriological Meat Inspection**].—*Berl. tierärztl. Wschr.* **50.** 458-459.

I. In the course of the last six years the author carried out 6,190 bacterio-

logical examinations of meat and meat products. In about 100 cases he found organisms responsible for food poisoning in man. These belonged chiefly to the Gärtner group and were found in the flesh of cattle and calves and, in two cases of pig flesh examined, *Bact. suipestifer* was isolated. The spleen is recommended as a suitable organ from which to obtain specimens.

II. Malachite green agar is strongly recommended for the growth of organisms of the food poisoning group in bacteriological meat inspection work. By using this substance for plate culture, food poisoning organisms can easily be cultivated, whereas *coli* bacteria and *Proteus vulgaris* do not seem to thrive on this media : pure cultures of food poisoning bacteria can, therefore, be obtained.

—D. J. Anthony.

THERAPEUTICS.

I. Steck, W. (1933). Contribution expérimentale au problème de la chimiothérapie dans le contrôle de la mammite streptococcique contagieuse (Nocard et Mollereau). [**Experimental Contribution to the Problem of Chemotherapy in the Control of Contagious Streptococcus Mastitis (Nocard and Mollereau)**].—*Le Lait.* **13.** 395-421. 15 tables. [18 refs.]

II. Chambers, F. (1934). **The Treatment of Streptococcal Mastitis.**—*Vet. J.* **90.** 285-286.

I. Whilst of the opinion that the problem of chemotherapy in contagious streptococcus mastitis is not yet solved, Steck feels that a discussion of the difficulties involved may be of value, particularly since other methods, such as vaccination and frequent stripping, have not proved satisfactory and since separation of infected and non-infected animals is difficult to maintain for a prolonged period.

He discusses the relative action of various acridine dyes *in vitro* and *in vivo*, the methods of injection which may be used, the impossibility of accurately gauging the best concentration of a given agent and its irritant effect owing to retention of any solution injected into the udder, and differences in individual susceptibility ; he also deals with the great difficulty of sterilizing certain quarters, as many as seven injections being at times ineffective. Of four quarters of the same cow, one may resist treatment. New infections are more easily cured than older ones. Severe infections are not necessarily the most difficult to cure. Quarters which appeared to be cured for long periods as judged from the examination of 0·5 c.c. of milk may relapse. Not until latent infection can be cured by more simple and less irritant methods will chemotherapy be generally applicable. These and other points are illustrated by detailed examples from his records.

Finally the control of streptococcus mastitis is discussed in general, emphasis being laid on the necessity of cultural examination to detect infected quarters and to measure the efficacy of chemotherapeutic injections.

The article repays reading for the light which the author's experience sheds on chemotherapy in mastitis and equally for its insight into the practical difficulties of the problem in general.

II. As an example of the good results which he has obtained by the injection of " entozon " *via* the teat canal in the treatment of streptococcus mastitis, Chambers reports three cases in which clinical symptoms disappeared after its use.

—A. W. Stableforth.

Rigg, T., & Askew, H. O. (1934). **Soil and Mineral Supplements in the Treatment of Bush-Sickness.**—*Empire J. Exp. Agric.* **2.** No. 5. 1-8. 3 figs., 1 plate, 4 tables. [10 refs.]

A disease in the Glenhope district of New Zealand showing close similarity to the "bush-sickness" of the Rotorua district [this *Bull.* **3**, 374.] was investigated by grazing healthy hoggets on affected pasture and dosing small groups twice a week with (a) finely ground limonite containing 22 per cent. of available iron oxide (i.e. soluble in N 10 oxalic acid); (b) Nelson soil containing 8 per cent. available iron oxide and (c) iron ammonium citrate (0·75 g. per dose). Group (b) remained free from the disease and increased steadily in weight; group (c) remained free from clinical manifestations of the disease but showed considerable individual differences in weight, while in group (a), as in the control group, a number of badly affected cases occurred. The failure of the Onekaka limonite suggested that an adequate supply of iron is not alone sufficient to prevent the Glenhope ailment and that some other factor also operates.—H. H. Green.

I. Froger. (1933). Le triformol-glycérine-allylique dans le traitement de la bronchite vermineuse des Bovidés. [**"Triformol-glycerine-allylique" in the Treatment of Parasitic Bronchitis in Cattle**].—*Rec. Méd. vét.* **109**, 911.

II. Beydemüller. (1934). Die Spulwurm- und Bandwurmkrankheit der kleinen Haustiere und ihre Bekämpfung mit Nemural und Askaridol "Bayer." [**"Nemural" and "Ascaridol" (Bayer) as Treatment for Roundworms and Tapeworms in Small Animals**].—*Tierärztl. Rdsch.* **40**, 43-46. [2 refs.]

I. Two intratracheal injections of 5 to 10 c.c. of this substance were found to be more effective against *Dictyocaulus* than any of the well-known intratracheal injections. It was observed that the use of an isotonic solution at about blood heat obviated the reflex cough which usually follows the injection.

II. As a result of considerable series of trials, the author concludes that Bayer's "ascaridol" is a safe and most effective remedy for roundworms in dogs, cats and swine, that "nemural", a complex pyridine derivative, is safe and effective for tapeworms in dogs and cats and that a mixture of "ascaridol" and "nemural" is safe and effective for tapeworms and roundworms in poultry, but not in dogs and cats, since the purgative action of the "nemural" removes the "ascaridol" before it has time to act.—E. L. Taylor.

I. Thomas, E. F. (1933). **A Preliminary Report on the Study of Poultry Vermifuges.**—*J. Amer. Vet. Med. Ass.* **83**, 61-75. 4 figs., 9 tables. [4 refs.]

II. Bleecker, W. L., & Smith, R. M. (1933). **Further Studies on the Relative Efficiency of Vermifuges for Poultry.**—*Ibid.* 76-81. 1 table. [8 refs.]

III. Bleecker, W. L., & Smith, R. M. (1933). **Nicotin Sulfate as a Vermifuge for the Removal of Ascarids from Poultry.**—*Ibid.* 645-655. 1 fig., 1 table. [10 refs.]

I. A series of observations on the effects of anthelmintic treatment with tetrachlorethylene and kamala and iodine vermicide, as recommended by Chandler, has led to the conclusion that our present methods of treatment are worse than the disease and "that the best procedure for poultrymen to follow would be to inaugurate sanitary measures to prevent infestation as far as possible. When infestation does occur, cull vigorously, and forget worm treatment until some vermifuge and method of use has been found, tested, and proven beneficial, by the use of control flocks."

II. As a result of experiments on 136 fowls, it is concluded that nicotine sulphate mixed with kamala is 100 per cent. effective for all common worms except the caecal worms. A preparation of nicotine sulphate and Lloyd's alkaloidal reagent each proved to be about 75 per cent. efficient.

III. As a result of a series of trials with several nicotine-containing vermifuges, it is concluded that they are effective in removing *Ascaridia lineata* and, if combined with kamala, are also effective against cestodes. The depressing action of the nicotine on egg-producing birds is sometimes very marked and the treatment cannot be generally recommended.—E. L. Taylor.

Baudet, E. A. F., & de Boer, E. (1933). Over het gebruik van derrispoeder, rotenon, teerpreparaten en terpentijn bij de bestrijding van der runderhorzellarve. [**On the Use of Derris Powder, Rotenone, Tar Products and Turpentine in the Control of the Larva of the Ox Warble-Fly**].—*Tijdschr. Diergeneesk.* **60.** 639-647. [7 refs.] [English, French and German summaries]. [Copied *verbatim* from *Rev. Appl. Entomol.* **22.** 152].

Experiments against *Hypoderma bovis*, DeG., on cattle in Holland were carried out with a water extract of derris made by soaking 10 lb. derris powder containing 2 per cent. rotenone in 9 gals. water for 24 hours, after which 2½ lb. soft soap dissolved in 1 gal. water is added. The extract must be prepared just prior to use. As a rule one application was sufficient, but a second a few days later ensured the death of all the larvae. The mixture was well brushed on to the backs of the animals, 5-14 fl. oz. being required for each. An ointment of vaseline containing 2 per cent. rotenone also gave excellent results, the hair round the warble being cut before its application. Rotenone dissolved in tar oil killed the larvae, but the resultant irritation makes it unsatisfactory in practice. Mixtures of rotenone with turpentine also produced irritation and were not so effective.

—. (1934). **Pyrethrum for Winter Control of Lice and Ticks.**—*Vet. Med.* **29.** 66-67.

The use of freshly ground pyrethrum (1 lb. mixed with 3 lb. of flour) is recommended for the dry treatment of domestic animals carrying lice or ticks. A powder spray is the most satisfactory method of distributing the parasiticide. This treatment is recommended chiefly when it is inadvisable to dip or wash the animals. —J. E.

Singer, E., & Fischl, V. (1934). Der Nachweis von Arsenikalien in Spirochäten und Trypanosomen. [**The Demonstration of Arsenic in Spirochaetes and Trypanosomes**].—*Zschr. Hyg. Infektkr.* **116.** 36-40.

Fischl, V., Kotrba, J., & Singer, E. (1934). Der Nachweis von Gold in Spirochaten und Trypanosomen. [**The Demonstration of Gold in Spirochaetes and Trypanosomes**].—*Ibid.* 69-71.

[Copied *verbatim* from *Trop. Dis. Bull.* **31.** 510-511. Signed by E. H.]

Details are given for the chemical analysis of the mineral content of trypanosomes and spirochaetes in order to determine the amount of arsenic or gold in these organisms after treatment with organic arsenical compounds or gold preparations. The arsenic is estimated by a modification of the Marsh test and the gold is estimated by a spectrographic method. Both in the case of trypanosome and spirochaetal infections the results of analyses at different intervals after treatment suggest that the chemotherapeutic agents unite directly with these organisms as indicated by the metal content.

The results of analyses for arsenic in trypanosomes and spirochaetes from infected mice treated respectively with atoxyl, tryparsamide and neosalvarsan are shown in the following table :–

Nagana : 1/200 gm. Atoxyl per 20 gm. Mouse.

Interval after Treatment when Blood was Collected.	Volume of Blood in c.cs.	Arsenic Content in γ		
		Plasma.	Red Cells.	Trypanosomes.
10 mins.	1·1	40	0·5	0·1
25 „	1·0	48	4·0	1·0
60 „	0·7	8	5·0	0·7

Nagana : 1/100 gm. Tryparsamide per 20 gm. Mouse.

10 mins.	1·0	30	1·0	0·3
20 „	1·2	28	0·3	0·2
30 „	0·9	50	3·0	0·3
60 „	0·7	16	0·8	0·6
180 „	1·2	3	2·5	2·5
240 „	0·7	6	2·0	1·5

Nagana : 1/600 gm. Neosalvarsan per 20 gm. Mouse.

10 mins.	0·9	2	1·6	0·0
20 „	0·7	4	0·0	0·3

Relapsing Fever : 1/600 gm. Neosalvarsan per 20 gm. Mouse.

				Spirochaetes.
10 mins.	0·9	2	2·0	0·2
25 „	0·7	16	0·0	1·0
60 „	0·3	8	1·2	0·4
120 „	1·4	7	1·0	0·8
180 „	1·5	12	0·5	1·2
300 „	0·8	6	0·2	2·2

SMYTHE, C. V., & REINER, L. (1933). **Toxic Effect of Sodium Monoiodoacetate on Trypanosomes.**—*Proc. Soc. Exp. Biol. & Med. New York.* **31.** 289-292. [15 refs.] [Copied *verbatim* from *Trop. Dis. Bull.* **31.** 580. Signed by W. Y.]

The authors have studied the trypanocidal action of sodium monoiodoacetate both *in vitro* and *in vivo*.

In vitro experiments showed that a 0·001 M solution killed *T. equiperdum* in from 2 to 3 minutes. Preliminary experiments on 14 rats showed that the maximum tolerated dose of sodium iodoacetate injected intravenously into a normal 240 gm. rat is 0·2 c.c. of a 0·25 M solution. Subcutaneous and intramuscular injections gave approximately the same results. When this dose was injected into a rat infected with *T. equiperdum*, the blood became free from trypanosomes within 2 to

3 hours. A number of the infected animals died sometimes after the trypanosomes had disappeared from the blood. This suggested to the authors that the infected animals were somewhat more sensitive to the drug than normal rats. The blood remained free from trypanosomes for from 2 to 10 days. A second dose cleared the blood for about the same length of time, and the treatment has up to date been repeated seven times and the animals are apparently in good health, with the exception of some inflammation and soreness at the place of injection.

The authors remark that there are differences in the action of iodoacetate and of arsenicals. Thus, the action of the former could not be prevented either *in vitro* or *in vivo* by the addition of sulfhydryl in the form of cystein or thiosulphate solution, whereas arsenicals were detoxified in analogous experiments. Further experiments showed that an arsenic resistant strain of trypanosomes is just as sensitive to iodoacetate as is the normal strain.

MANWELL, R. D. (1934). **Quinine and Plasmochin Therapy in Infections with *Plasmodium circumflexum*.**—*Amer. J. Trop. Med.* **14.** 45-59. [24 refs.] [Copied *verbatim* from *Trop. Dis. Bull.* **31.** 428-429. Signed by W. F.]

Related species of parasites respond differently to chemotherapy and each species may require a separate drug for effective treatment.

Plasmodium circumflexum was first described by KIKUTH, in 1931. The average incubation period after the intramuscular inoculation of canaries was 8·6 days ; it varied with the dose. The average duration of the acute period was about a week ; the mortality was higher than in *P. praecox* infection and equal to that of *P. cathemerium* ; 25 per cent. of the birds died. Relapse is common during the first 6 weeks of the chronic stage, and is often fatal.

Treatment with quinine or plasmoquine during the incubation period will prevent the onset as long as it is continued ; sometimes it will abort the infection altogether, but usually the attack comes on when the drug is stopped. Treatment during the acute stage is less effective ; plasmoquine quickly clears the peripheral blood, quinine is relatively ineffective, but neither of them sterilizes the bird and relapses are common. The combination of quinine with plasmoquine does not strengthen the action of the latter.

" The susceptibility of the five species of avian plasmodia here considered to treatment with quinine and plasmochin appears to be as follows, the most susceptible being given first."

Quinine.	Plasmoquine.
1. *P. rouxi*	1. *P. elongatum*
2. *P. praecox*	*P. rouxi*
3. *P. cathemerium*	2. *P. praecox*
4. *P. circumflexum*	3. *P. circumflexum*
5. *P. elongatum*	4. *P. cathemerium*

TUTT, J. F. D. (1934). **Intravenous Treatment of Milk Fever with Calcium Gluconate.**—*Vet. J.* **90.** 282-283.

This is a note on the calcium-infusion treatment for milk fever. Tutt recommends the milk vein for the intravenous injection of calcium gluconate. He states, however, that solutions of calcium chloride are not suitable for injection into the milk vein on account of their liability to cause extensive clotting.—J. E.

—. (1934). Ca-terapin vid förlossningsförlamning hos ko. [**Calcium Therapy for Milk Fever**].—*Suomen Eläin.-lehti.* **40.** 106-107. [In Swedish : abst. from orig.]

An editorial note on the treatment of milk fever. The following prescription is recommended :– calcium chloride 15 g., caffein-sodium salicylate 2 to 3 g., physiological saline 1,250 c.c.—J. E.

Larsson, A. R. (1933). Varmvattenbehandling mot sterilitet. [**Hot Water Treatment for Sterility**].—*Svensk Vet.-tidskr.* **38.** 342-344.

A general hyperaemia of the genital tract in sterile females has been found to be of benefit, especially in the cow. The treatment consists of irrigation of the vagina with hot water (45° to 47° C.) about 20 to 30 litres being slowly introduced over a period of 15 to 20 minutes. This is done every day for three or four days. It is not advisable to commence the hot water treatment on the same day as carrying out ovarian manipulation for cysts or persistent corpus luteum, owing to the risk of internal haemorrhage, but it is perfectly safe to commence treatment on the following day.

Oestrum will appear on the fifth day in uncomplicated cases and the cow should then be put to the bull, when conception may be expected to follow.

—A. A. Forsyth.

I. Kučera, C. (1934). Chloralhydrat-Narkosen bei Haustieren. [**Chloral Hydrate Narcosis for Domestic Animals**].—*Schweiz. Arch. Tierhlk.* **76.** 129-141. [10 refs.]

II. Kučera, C. (1933). Chloralhydrátová narkosa u domácích zvířat. [**Chloral Hydrate Narcosis for Domestic Animals**].—*Klin. Spisy Skoly Zverol. Brno.* **10.** 157-174. 5 tables. [8 refs.] [Abst. from German summary].

I. The author discusses the pharmacology and practical application of chloral hydrate narcosis in domestic animals. He experimented on rats, lambs, kids and pigs in order to establish standards of dosage.

He concludes that chloral hydrate is an excellent narcotic for all the domestic animals. For the production of deep narcosis lasting for 30 to 60 minutes the suitable dose per kg. body weight is 0·27 g. for immature animals and 0·20 to 0·25 g. for adults. It is most conveniently applied intraperitoneally in a 7 to 10 per cent. aqueous solution. The best antidotes for overdosage are thyroxin and caffein, which accelerate the excretion of the drug.

II. This article is substantially the same as I.—J. E.

POISONS AND POISONING.

I. Gould, G. N., Jr., & Morgan, K. G. (1934). **Acorn Poisoning.**—*Vet. Rec.* **14.** 33-35.

II. Jones, L. L. (1934). **A Few Notes on a Disease in Cattle known as "Acorn Poisoning."**—*Ibid.* 329-331.

I. This paper contains valuable clinical observations made in the New Forest area in the autumn of 1933 when the crop of acorns was abundant. The first symptom of acorn disease is a falling off in milk of from 2 to 10 lb. a day, and it is noticed that a whole herd may be passing considerable quantities of chewed acorn, without any further untoward effect. In more serious cases, in addition to a marked fall in lactation, there is a tendency to recumbency, inappetence for water and for food—other than acorns, for which a craving develops, and the intermittent passage of small quantities of faeces. In fatal cases these symptoms are aggravated and followed by flatulence and abdominal pain, subnormal temperature, small and weak pulse and laboured respiration. Death usually occurs in a

bout of struggling and, in every fatal case except two, it had been impossible to induce defaecation. The lesions are generally those of gastro-enteritis.

In treatment, saline purgatives are contra-indicated, liquid paraffin proving valuable in doses of 0·5 to 1 gall. a day, with subcutaneous injection of liq. strychninae and administration of stimulants in milk or mucilage.

II. The author records his experience in similar circumstances in 1933 in Montgomeryshire. The clinical and *post-mortem* observations and remedial methods in general agree with those described above, it being noted, however, that full doses of chlorodyne following liquid paraffin gave good results.

It is suggested that the disease observed was coccidiosis, and four cases are quoted in which pathological examination revealed more or less intense coccidial infestation.—G. D. Lander.

Mathews, F. P. (1933). **The Toxicity of Baileya Multiradiata for Sheep and Goats.**—*J. Amer. Vet. Med. Ass.* **83.** 673-679. 2 figs., 1 table.

This plant, which was suspected to be the cause of deaths of sheep in southern California and west Texas, was fed in the green and dry states to sheep and goats, and proved to be toxic. The susceptibility varied somewhat widely ; for instance, death occurred in 23 days after feeding 19 lb. of the dry plant to a sheep weighing 65 lb. and in 94 days after feeding 58 lb. (dry) to a sheep weighing 90 lb.

Illness was marked by greenish frothing at the mouth, rapid pounding of the heart on movement, and periods of trembling and weakness. When forced to stand the back was arched, the head lowered and all four feet close together. The lesions were not of diagnostic value.

So far as is at present known, the plant is not dangerous to cattle.

—G. D. Lander.

I. Couch, J. F. (1933). **Trembles (or Milk Sickness).**—*U.S. Dept. Agric. Circ.* No. 306. pp. 12. 7 figs. [26 refs.]

II. Pineteau, M., Pineteau, M., Jr., & Pineteau, R. (1934). Intoxication des porcs par les aliments cuits à base de betteraves. [**Beetroot Poisoning in Pigs**].—*Rev. vét. et J. Méd. vét.* **86.** 144-167.

I. This circular gives an account of " trembles " or " milk-sickness," a disease which has been observed in North Carolina, the middle-west and south-west during the last hundred years, and which affects both human beings and animals. It is caused in cattle by the consumption of *Eupatorium urticaefolium*, or white snakeroot, *Aplopappus heterophyllus*, or " Jimmyweed," and the allied *A. fruticosus*, and is attributed to tremetol, a viscous laevorotory oil of pleasant aromatic odour, having the composition $C_{16}H_{22}O_3$ and allied to the higher alcohols.

The poisoning is transmitted in milk and butter, and symptoms may be induced in human beings by these products from a beast which itself has not received a sufficient dose to cause illness. In animals the course of the illness is marked by depression and slow gait succeeded by the characteristic " trembles ", when the whole body is forcibly shaken in a longitudinal direction, which is followed by collapse. There is marked ketosis, and the strong smell of acetone in the breath often serves as an accurate means of diagnosis. As much as 34·25 mg. of acetone per 100 c.c. of urine has been noted.

For cattle, drenching with bicarbonate of soda, a large dose of Epsom salt, feeding on oats, a liberal supply of water, and rest are advocated. Exertion may lead to dangerous relapse.

II. This paper contains notes of 16 cases of poisoning in pigs attributed to the feeding of the cooked roots and leaves of such vegetables as cabbage and potato,

but in particular of beetroot. The precise causation is not known, being somewhat vaguely attributed to volatile products of fermentation.—G. D. Lander.

Brundza, A. (1934). Arkliu apsinuodijimai pasarais. [**Food Poisoning in the Horse**].—*Vet. ir Zootech. Kovno.* **10.** 14-26. [Abst. from German summary].

In the course of 12 years' practice the author has seen many cases of poisoning in horses by Swedish clover (*Trifolium hybridum*), yellow lupin (*Lupinus luteus*) and vetches (*Vicia sativa, villosa, cracca*).

Horses poisoned by Swedish clover have a normal or subnormal temperature; they tend to move backwards, sway on their hind legs and swing their heads. Sometimes the head becomes swollen and the mucous membranes are icteritic. Venesection (3 litres), subcutaneous injections of adrenalin, calcium, Fowler's solution of arsenic and strychnine are said to be efficacious as treatment.—J. E.

I. Slagsvold, L. (1934). Fluorforgiftning. [**Fluorine Poisoning**].—*Norsk Vet.-tidsskr.* **46.** 2-16 and 61-68. 3 figs. [English and German summaries: abst. from orig.]

II. Lilleengen, K. (1934). Mikroskopisk undersökelse av benpreparater fra sauer lidende av kronisk fluorforgiftning. [**Histological Examination of the Bones of Sheep suffering from Chronic Fluorine Poisoning**].—*Ibid.* 68-79. 6 figs. [6 refs.] [German summary: abst. from orig.]

I. This paper gives a brief summary of chronic fluorine poisoning in domestic animals and a description of chronic progressive sickness in sheep and cattle on farms in the neighbourhood of aluminium factories. On the basis of analyses and feeding experiments it was proved to be fluorine poisoning, due to the fact that the vegetation in the neighbourhood was contaminated with dust from the factories impregnated with fluorine, because cryolite, which contains compounds of fluorine, is used in the production of aluminium.

The dust also contains a large number of sharp-edged particles of aluminium oxide. These particles produce a complication of the disease in the sheep in the form of irregular, excessive wear of the molars.

II. The bones examined originated chiefly from experimentally produced chronic fluorosis. [Slagsvold, L. (1928). *Norsk Vet.-tidsskr.* **40**]. The changes have a strong resemblance to those found in typical osteomalacia.

—L. Slagsvold (Oslo).

Roholm, K. (1934). Fluorose der Schafe auf Island nach Vulkanausbrüchen? [**Fluorosis in Sheep in Iceland after Volcanic Eruptions**].—*Arch. wiss. prakt. Tierhlk.* **67.** 420-435. 7 figs. [28 refs.]

The sight of some bones from Iceland sheep, which had died after a volcanic eruption, caused the author to investigate the condition, as the bones showed similar changes to those of animals poisoned by fluorine.

This condition is characterized by a thickening of the bones, which may be very considerable, particularly of the mandible and long bones of the limbs, the thickening being due to exostosis.

Perusal of the available published annals of Iceland revealed a number of accounts of losses of livestock after volcanic eruptions. In order, therefore, to test his theory the author examined the available bones, which had been collected in Iceland in 1845 and were now lodged in the Veterinary College, Copenhagen. At the same time he gave sodium fluoride, amounting to 15 mg. of flourine per kg. body weight daily to two experimental sheep. One sheep (the older) died on the

51st day and the other on the 71st day of the experiment. After maceration the bones of these animals showed changes almost identical with those of the museum specimens. The teeth, in the author's cases, did not show erosions. [This is unlike VELU's cases of " darmous " – this *Bull.* **2.** 509. – and may possibly be due to the short time during which the sheep received fluorine].

The author reviews the literature on fluorosis of domestic animals, and with the support thus obtained does not hesitate to attribute the Iceland diseases of volcanic origin to fluorine poisoning.—J. E.

PHYSIOLOGY.

I. RODOLFO, A. (1934). **The Physiology of Reproduction in Swine. I. The Semen of Boars under Different Intensiveness of Mating.**—*Philippine. J. Sci.* **53.** 183-203. 1 fig., 5 tables. [5 refs.]

II. LAGERLÖF, N. (1934). Morphologische Untersuchungen über Veränderungen im Spermabild und in den Hoden bei Bullen mit verminderter oder aufgehobener Fertilität. [**Changes in the Spermatozoa and in the Testes of Bulls with Impaired or Enhanced Fertility**].—*Acta. path. et microbiol. scand.* Suppl. No. 19. pp. 254. 51 figs., 30 plates, 17 tables, 2 charts. [273 refs.]

I. By means of an artificial vagina, the author has studied the volume and composition of semen obtained from a series of boars. It appears that there is no correlation between the volume of the semen ejected and the total number of spermatozoa present, and that the number of spermatozoa ejected by an individual boar varies widely from time to time. The number of motile spermatozoa in a sample of semen is largely dependent upon the number of matings permitted to the animal, and it is suggested that a boar should not be mated more than once a day for two consecutive days and that it should then be rested for at least two days. Boars should not be mated intensively until they are two years old. The spermatozoa appear to be non-motile when they leave the testes and to require a stay of at least 36 hours in the epididymis before motility is acquired.

II. The author has made a comprehensive study over a period of years on the reproductive powers of a series of bulls, paying particular attention to the connection between the morphology of the spermatozoa and disease processes or functional disturbances of the testes. In bulls with good powers of reproduction, it was found that the average number of mature spermatozoa is 800,000 per c.c. of semen ; pathological spermatozoa do not exceed 18 per cent. of the total and immature forms are absent. In cases of testicular hypoplasia the number of spermatozoa drops considerably and a large number of immature forms is present in the semen. Degenerative testicular changes varied from slight degeneration and desquamation up to complete destruction of the seminal epithelium, with thickening or hyalin degeneration of the membrana propria. Where the degenerative changes are slight, the number of spermatozoa in the semen remains almost normal, but as the disease increases immature forms become more prevalent. An acute and chronic form of orchitis was met with in every case caused by *Br. abortus*, and it was always shown that spermogenesis had stopped because of degeneration of the seminal epithelium. In cases of fibrosis of the testes, these organs become invaded by a diffuse or compact sclerosis, which very rapidly inhibits spermogenesis. The author is of the opinion that in most cases it is possible to determine the reproductive powers of a bull from an examination of the morphology and numbers of the spermatozoa.—J. A. NICHOLSON.

Okljesa, B. (1934). O veličini i tezini kravljih ovarija. [**Size and Weight of the Ovaries in Cows**].—*Vet. Arhiv.* **4.** 264-280. [8 refs.] [Abst. from French summary].

The author records the results of his observations on the dimensions and weights of the ovaries of 309 cows. The maximum and minimum figures are given in tabular form. The average figures were : length 3·3 cm., width 2·1 cm., thickness 1·6 cm. and weight 7·25 gm. The right ovary was always larger than the left and the maxima and minima represented differences of about 60 per cent. from the average figures given.—J. E.

I. Champy, C. (1934). Effets de l'ablation et de la greffe des glandes génitales. Rapport général. [**Review on Gland Grafting**].—*Rev. Path. comp.* **34.** 792-809. [4 refs.]

II. Voronoff, S. (1934). Etat actuel de la greffe testiculaire. [**The Position of Testicular Grafting (Review)**].—*Ibid.* 810-821.

III. Retterer, E., & Alexandresco, G. (1934). Etude descriptive des Greffons testiculaires. [**Morphology of Testicular Grafts**].—*Ibid.* 821-847.

IV. Dartigues. (1934). Les techniques opératoires des greffes endocriniennes de l'animal à l'homme et à la femme. Synthèse ; projections. [**Technique of Gland Grafting**].—*Ibid.* 847-855.

V. Sainton, P., & Largeau, R. (1934). Les troubles nerveux et psychiques consécutifs à la Castration chez l'homme et chez l'animal. [**Nervous Troubles following Castration in Man and Animals**].—*Ibid.* 855-879.

VI. Velu, H. (1934). La greffe testiculaire dans la pratique vétérinaire. [**Gland Grafting in Veterinary Practice**].—*Ibid.* 879-889.

VII. Trouette. (1934). Essais de Greffes testiculaires dans l'espèce ovine. [**Testicular Grafting in Sheep**].—*Ibid.* 889-893.

I. The effects produced in the animal body by the activity of the sex glands may be divided into two types, those which are due to the activity of the glands during growth and which regress on the removal of the glands, and those which are due to the action of the glands when they reach maturity and which persist after the removal of the glands. Certain male characters, e.g. the male plumage of birds, do not result from the activity of the testes but from the absence of inhibitory factors produced by the ovary.

Transplants have the same effects as grafts, but their influence lasts a short time only and the tissue soon dies. In certain cases the effects of a transplant appear to persist ; this is not due to the transplant becoming a true graft but to the fact that the reaction induced is irreversible. The " all or none " rule does not apply to grafts and transplants as a small amount of active tissue will produce some effect ; on the other hand, increasing the amount of tissue transplanted above a certain quantity will not increase the effects produced.

II. The author claims that testicular grafts produce beneficial effects in men and animals enfeebled by age, and in young animals before puberty. In the first case, increased bodily and mental vigour are brought about and in the second case, increase in weight and improvement of the wool are to be looked for in sheep. A testicular graft should always be made into the scrotum and the tissue taken from young subjects of the same species, particular attention being paid to blood affinities. The effects of a graft are not seen for two to three months after operation and the general improvement lasts for six to seven years in the human subject (grafts from monkeys).

III. Histological examinations have been made of testicular tissue which has been grafted into a series of dogs, a goat and two men, and which remained alive in the hosts from a few weeks to several years. It was seen that the grafts

maintained their original shape and were not invaded by connective tissue from the host. The greatest change was observed in the peripheral portions of the grafts which had been in direct contact with the tunica vaginalis. Here connective tissue developed in the course of time. In the central portions the cells showed an affinity for " Sudan III " and signs of degeneration.

IV. Various endocrine glands may be grafted into the same individual, but to be successful they must be inserted into a position similar to that which they occupied in the donor. A detailed description is given of the surgical manipulations required to carry out a successful gland-grafting operation.

V. It appears that the suppression of the functions of the gonads is of much greater importance in human beings than in animals. In young animals little or no nervous effects are produced and, in adults, the reduction of aggressive tendencies is probably due to metabolic changes.

VI. Some authors claim that testicular grafts are highly successful while others assert that they produce no beneficial effects. This state of affairs is chiefly due to the fact that workers only accept results which fit in with their own theories. Rarely is anything but a transplant accomplished, and when the effect of this wears off a second transplant has no further influence. Some species or breeds of animals react more favourably to transplants than others, and the author claims to have had highly successful results with Algerian sheep, whereas he has met with failure when more highly bred sheep were used.

VII. Experiments have been carried out on native Algerian sheep to determine the advantage of testicular grafts. In each case testicular tissue was grafted into the scrotums of one-year-old ram lambs. After some months the average body weight and the average weight of the fleeces of the experimental animals were greater than those of the controls. The progeny of the experimental animals also appeared superior to that of the control animals.—J. A. NICHOLSON.

I. MAGNUSSON, H. (1934). Om graviditetsdiagnos hos sto genom blodserum. [**Pregnancy Diagnosis in the Mare using Blood Serum**].—*Skand. Vet.-tidskr.* **24.** 141-157. 3 tables. [9 refs.] [English summary : abst. from orig.] [*Verbatim* translation appeared in *Rev. gén. Méd. vét.* **43.** 321-336].

II. MÅRTENSSON, J. (1934). Biologisk dräktighetsdiagnostik å ston. [**Biological Pregnancy Diagnosis in the Mare**].—*Ibid.* 158-162. 2 tables. [English summary : abst. from orig.]

I. Magnusson employed the modified Ascheim-Zondek test, using mice, and the Friedmann-Schneider test, using rabbits, to diagnose pregnancy in 140 mares by means of their blood serum. The error percentage was only 1·6 with samples obtained between the 6th and 10th weeks of gestation.

II. Mårtensson, when making tests for pregnancy on 53 mares, obtained 100 per cent. accuracy when using the same tests as MAGNUSSON. The rabbit test has the advantage of yielding more rapid results.—J. E.

I. REMLINGER, P., & BAILLY, J. (1934). Le diagnostic biologique de la gestation en médecine vétérinaire. [**Biological Diagnosis of Pregnancy in Veterinary Medicine**].—*Bull. Acad. vét. France.* **7.** 150-154. [3 refs.]

II. REMLINGER, P., & BAILLY, J. (1934). Les Equidés et le diagnostic biologique de la gestation. [**Biological Diagnosis of Pregnancy in the Mare**].—*Ibid.* 197-200. [2 refs.]

III. CUBONI, E. (1934). Una rapida reazione di gravidanza nella cavalla. [**A Rapid Pregnancy Diagnosis Test for Mares**].—*Clin. Vet. Milan.* **57.** 85-93. 1 plate, 1 table. [19 refs.]

IV. Bruhn, W. (1933). Versuche zur hormonalen Schwangerschaftsreaktion beim Rinde. [**Hormonal Diagnosis of Pregnancy in Cattle**].—*Inaug. Diss. Hanover*. pp. 55. 5 tables. [70 refs.]

V. Küst, & Vogt. (1934). Versuche über die Möglichkeit der Trächtigkeitsfeststellung beim Schafe durch den Nachweis von Geschlechtshormonen im Harn und Blute. [**Hormonal Pregnancy Diagnosis in Sheep**]. *Deuts. tierärztl. Wschr.* **42.** 241-243. [7 refs.]

I. Using Friedmann's technique for the diagnosis of pregnancy in human patients, the authors have examined urine from pregnant cows, sows, goats, rabbits and guinea pigs. In no case was a positive reaction observed, and they consider that the method is of no value for the diagnosis of pregnancy in domestic animals.

II. Using the same technique as before, the authors examined the urine and blood serum from pregnant mares and donkeys. Again all the results were negative.

III. Biological methods of demonstrating oestrin in urine possess certain disadvantages, and the author has attempted to evolve a simple method which might be easily carried out in practice. 5 c.c. of filtered urine is mixed with 1 c.c. of concentrated hydrochloric acid, heated for ten minutes on a water-bath at 100° C. and cooled ; 6 c.c. of benzine is added and the solution is shaken and allowed to separate ; 1 c.c. of concentrated sulphuric acid is added to the extract and the mixture placed on a water-bath at 70° to 90° C. for a few minutes, shaken repeatedly and allowed to cool. If the reaction is negative a reddish brown colour is produced ; if it is positive a fluorescent green colour appears. 110 non-pregnant mares and four stallions gave negative reactions, whilst 43 mares, which were proved to be pregnant by clinical examinations and biological tests, gave positive results.

IV. The reactions produced in immature mice by the inoculation of urine from pregnant cows show that up to the end of the 16th week of pregnancy no oestrin is present in the urine. From the end of the 17th week until the 22nd week a variable amount is present, and from the 22nd week to the fifth month the urine contains 800 to 1,600 mouse units per litre. After the fifth month the amount of oestrin drops to about 800 units per litre and remains at this figure until parturition. Prolan was never found in the urine, nor were sex-hormones found in the blood serum, saliva, milk or faeces. In non-pregnant animals, in cows in heat and in animals having ovarian cysts, no sex-hormones are to be found in any of the excretions or secretions.

V. In order to determine whether it is possible to diagnose pregnancy in the ewe by biological methods, samples of blood and urine from three pregnant ewes and one which had aborted were injected into a series of immature mice and rats. In no case was a reaction observed in the test animals which suggested the presence of sex-hormones. The authors conclude that the present biological methods for the diagnosis of pregnancy are not applicable to sheep.

—J. A. Nicholson.

Pribyl, E. (1933). Křemík V krevním seru skotu, ovcí koz a vepřů. [**Silica Content in the Blood Serum of Cattle, Sheep, Goats and Pigs**].—*Klin. Spisy Skoly Zverol. Brno.* **10.** 1-21. 4 tables. [31 refs.] [French and German summaries : abst. from orig.]

The silica content of the blood serum of healthy cattle was found to be 0·948 to 2·172 mg. per cent. (average 1·394 mg.) ; of sheep, 1·074 to 1·308 mg. per cent. (average 1·219 mg.) ; of goats, 0·909 to 1·230 mg. per cent. (average 1·044 mg.) and of pigs, 0·725 to 2·011 mg. per cent. (average 1·327 mg.). The silica content

of the blood serum of cows after calving was slightly less than the above figures. The determination of silica was carried out by King's colorimetric method.

The work was done with regard to general physiology and to calculus formation.

—E. Pribyl (Brno).

I. Linton, R. G. (1934). **The Composition of " Witch's " Milk.**—*Vet. J.* **90.** 213-215. [9 refs.]

II. Linton, R. G. (1934). **Prolonged Lactation Periods. (II).**—*Vet. Rec.* **14.** 691-692. 4 tables. [1 ref.]

I. Analyses of milk obtained from two foals a few days after birth showed that the mammary secretion of the new-born resembles true milk. The amount of globulin in one of the samples was greater than that found in normal mare's milk, which suggests that the secretion may resemble colostrum.

II. An account is given of a cow which had been milked continuously for six years and eight months. At the end of this period she was giving 18 lb. of milk daily. Analyses showed that the milk was of good quality and that the diet supplied was in excess of that required for maintenance and production.

—J. A. Nicholson.

Rous, P., & Beard, J. W. (1934). **Selection with the Magnet and Cultivation of Reticulo-endothelial Cells (Kupffer Cells).**—*J. Exp. Med.* **59.** 577-591. 11 figs., 2 plates. [Copied *verbatim* from *Bull. Hyg.* **9.** 637. Signed by W. W. C. Topley].

By a highly ingenious technique the authors have succeeded in obtaining samples of living Kupffer cells for study and cultivation. It was found that very few of these cells could be dislodged from the normal liver by forcible perfusion, but that they came away in great numbers after they had taken up finely particulate material such as Indian ink or iron oxide. In order to separate the Kupffer cells from the other elements present in the perfusion fluid a magnetic ferric oxide was used to prepare the particulate suspension, and the iron-containing cells were induced to collect on a collodion membrane covering a glass tube in which was inserted a core of soft iron, magnetized by a large unipolar electromagnet. The cells were washed *in situ* by a flow of Tyrode solution and were collected from the collodion membrane by submerging the tube in sterile rabbit serum and removing the magnetized iron core. The cells so collected could not be cultivated in a plasma clot, according to the usual technique ; but active cultures were obtained on discs of sterilized Leitz lens paper immersed in sterile rabbit serum that was changed daily. The cells migrated along the fibres, to which they fixed themselves ; and in this situation active multiplication took place.

It was noted that Kupffer cell preparations from normal rabbits remained sterile in most instances. When bacterial contamination occurred it seemed probable that it had arisen as an accident of technique. When, however, similar preparations were obtained from animals rendered febrile by the injection of nucleic acid, or of a killed culture of *Chr. prodigiosum*, bacterial contamination regularly occurred. The authors consider that this phenomenon is most readily explained on the view that the injection of these reagents favours a bacterial invasion of the blood-stream, presumably from the intestine.

TECHNIQUE.

I. Butterfield, C. T. (1933). **Comparison of the Enumeration of Bacteria by Means of Solid and Liquid Media.**—*Publ. Health Rep. Washington.* **48.** 1292-1297. 3 tables. [2 refs.]

II. Régnier, J., & Lambin, S. (1933). De la méthode de numération microbienne basée sur le dénombrement des colonies développées sur milieux solidifiés. Les dilutions de la suspension initiale sont-elles à rejeter? **[Method of Bacterial Count Based on the Enumeration of Colonies Grown on Solid Media]**.—*C. R. Soc. Biol. Paris.* **114.** 983-985. [1 ref.]

I. The author reports on a series of tests devised to compare the results of the plate colony and dilution methods for enumerating bacteria.

Using a suspension of *Bact. coli* there was marked agreement between the two methods, but with *Bact. aerogenes* the agreement was not so satisfactory. This he attributes to the greater tendency of *Bact. aerogenes* to clump, the dilution method tending to separate clumped organisms, thereby giving a higher count than the plate method.

Despite these differences the author concludes that for all practical purposes the agreement between the two methods is satisfactory.

II. Experiments have failed to substantiate the claims of some authors that, as a result of preliminary dilutions, marked discrepancies occur in the enumeration of organisms. Reliable results are obtained if care is taken in making the dilutions. They should be made gradually and the suspension never diluted more than a hundred times at each dilution, the fluid transferred from one tube to another being measured very accurately. The author also advocates using slight agitation with glass beads in order to procure an even suspension. Three cultures should be made of the particular dilutions to be studied, taking the average count after incubation for eight days and ignoring plates containing less than ten or more than 400 colonies.—Gwilym O. Davies.

I. Wakamatsu, Y. (1934). Ueber die Brauchbarkeit der Fortnerschen Methode für die Kultur der Rauschbrand- und Pararauschbrandbazillen. **[The Value of Fortner's Anaerobic Culture Method for Blackleg Bacilli]**.—*Deuts. tierärztl. Wschr.* **42.** 321-322. 2 figs. [5 refs.]

II. Miessner, H., & Schoop, G. (1934). Die Fortner-Methode in der Diagnostik der Gasödembazillen. **[The Fortner Method for Diagnosis of Gas Gangrene Organisms]**.—*Ibid.* 323-326. 2 figs., 4 tables. [5 refs.]

III. Grimm, G. (1934). Die Unterscheidung von Rauschbrand- und Pararauschbrandbazillen mittels der Haemolyse Reaktion im Reagenzglas. **[Differentiation of Blackleg and Parablackleg Bacilli by the Haemolysis Reaction]**.—*Inaug. Diss. Giessen.* pp. 39. [39 refs.]

I. The author obtained very satisfactory results in isolating members of the clostridium group from infected material from cattle and sheep with the use of Fortner's petri dish method. [This is a specially shaped dish with flanged edges. One half of the medium is seeded with the material for anaerobic culture, the other half is seeded with *Chromobacterium prodigiosum* to utilize all oxygen. The top and bottom of the plate are sealed together].

Excellent, though less reliable, results were also obtained with the use of Fortner's micro-method. The micro-method consists of allowing a thin layer of blood or serum agar to set upon one side of a sterile cover slip. The centre of this agar is inoculated with suspected material, and the periphery with *Chromobact. prodigiosum*. The cover slip is then placed upon a sterile slide and is sealed around the edge. The slide is examined microscopically at short intervals. By studying the early colony shape, when growth has been in progress for only a few hours, it is said to be possible to distinguish *Cl. chauvoei* from *Cl. septique*.

II. Fortner's petri dish technique proved suitable for differentiating various members of the clostridium group, including *Cl. chauvoei* and *Cl. septique*, and

gave better results in the isolation of the causal organism of gas gangrene, than were obtained by a technique in which excess oxygen is absorbed by alkaline pyrogallol.

III. Bernard's haemolysis test has been applied to differentiate *Cl. chauvoei* from *Cl. septique*. Over 90 strains of each were examined and it was found that *Cl. chauvoei* always produced haemolysis within two hours, whereas *Cl. septique* produced no haemolysis within this period. The test consists of the addition of 0·1 c.c. of a 24-hour liver broth culture of the clostridium to a mixture containing 2 c.c. of normal saline and 0·2 c.c. of a 3 per cent. suspension of washed sheep red blood corpuscles. The mixture is held at room temperature and the result is read after two hours.—E. J. Pullinger.

Mallmann, W. L., & Chandler, W. L. (1933). **On the Disinfection of Avian Fecal Material.**—*J. Amer. Vet. Med. Ass.* **83.** 190-196. 3 tables. [8 refs.]

The aim of the author was to check the unsatisfactory text-book information on the disinfection of avian faecal material. He employed laboratory methods for determining the action of certain disinfectants on fine faecal suspensions with subsequent plating out on culture media.

Even under these artificial conditions tincture of iodine, mercuric chloride (1 : 500), bleaching powder (1 lb. to 4 galls. water), formalin (10 per cent.), lye (10 per cent.) and creolin (1 per cent.) all failed to sterilize the material. Colloidal iodine (0·2 per cent.) was effective in the proportion of 200 : 1 with faecal matter. —J. E.

Weiss, R. (1934). Ein neues Instrument zur Rotlaufsimultanimpfung. [**A New Instrument for Swine Erysipelas Immunization**].—*Tierärztl. Rdsch.* **40.** 279-280. 1 fig.

The author describes an apparatus which facilitates the inoculation of pigs in large numbers. The usual 20 c.c. serum syringe and 5 c.c. virus syringe are both carried vertically side by side in spring clips on a metal plate, which is strapped to the operator's chest. The lower extremity of the plate is turned up to form a reservoir for an antiseptic solution, in which the hypodermic needles, each connected by rubber tubing to their syringes, are placed.

For making the actual injections, each syringe is detached and used in turn for each animal.—J. E.

Krueger. (1934). Der elektrische Treibstock, ein Mittel zum Tierschutz in Schlacht- und Viehhöfen. [**An Electrical Driving Stick for Livestock**].—*Zschr. Fleisch- u. Milchhyg.* **44.** 304-305. 1 fig.

The author describes a driving stick (prodder) for cattle, particularly for use in abattoirs. It takes the form of a cylindrical battery holder with a long metal extremity which, on pressure against an animal's body, recoils in a cylinder, closing the electric circuit and causing a shock to the animal in contact with it. —J. E.

MISCELLANEOUS.

Pavlof. (1934). La loi bulgare sur la prophylaxie des épizooties. [**The Law on Prevention of Animal Diseases in Bulgaria**].—*Bull. Off. internat. Epiz.* **7.** 1164-1171.

The three most important veterinary statutes in Bulgaria, relating to (a) food products of animal origin (1922), (b) the veterinary sanitary services (1924), and

(c) the sale of domestic animals (1924), have been amended by an "Act for the Encouragement of the Campaign against Epizootic Diseases," 1934. In order to secure the willing co-operation of stockowners, the principle of generous compensation has been adopted. Up to 100 per cent. is to be given for mammals or birds destroyed when infected or suspected of being infected with a scheduled disease but not showing clinical symptoms, or destroyed for the purpose of making a diagnosis, also for all healthy in-contact animals or skins destroyed; up to 75 per cent. for animals and birds affected with contagious disease with obvious clinical symptoms and slaughtered by order when the owner has given immediate notice to the authorities; up to 60 per cent. for solipeds and ruminants which, through no fault of the owner, have died from contagious diseases, except foot and mouth disease, tuberculosis and dourine.

Among the general regulations are provisions as to the notification of outbreaks, the transit of animals, prohibition of the sale of animals suffering from contagious disease, etc. A tribunal, consisting of a magistrate, the local veterinary surgeon, and a representative of the local council, is to settle all questions arising in litigation concerning defects rendering void the sale of an animal. The act is to be put into force by means of special regulations.—F. BULLOCK.

GÖTZE, R. (1933). Aufgaben des Hochschullehrgutes Adendorf der Tierärztlichen Hochschule Hannover. [**Work of the Instructional Farm of the Hanover Veterinary College at Adendorf**]. *Deuts. tierärztl. Wschr.* **41.** 737-740. 8 figs.

The farm was acquired in 1925 and is now used as a department of the college under the direction of the rector and Professors GÖTZE and BUTZ. It is run as an ordinary stock farm and plays an important part in grounding students in practical agriculture. In addition it provides premises and animals for certain research work, examples of which are referred to.—J. E.

VELUET, H. (1934). La Faculté de médecine vétérinaire de l'Université de Zagreb. [**The Veterinary Faculty of Zagreb University**].—*Rec. Méd. vét.* **110.** 345-347.

This paper gives an account of the history of the Yugoslavian veterinary college at Zagreb and a curriculum of its instructional course, the length of which is not given. The college forms a faculty to Zagreb University and grants a diploma and a doctorate.—J. E.

SCHMALTZ. (1934). Standesgeschichtliche Rückblicke. [**Historical Retrospect**]. —*Berl. tierärztl. Wschr.* **50.** 253-255, 380-383, 397-399 and 413-416.

Schmaltz takes the opportunity of the beginning of a new era in the organization of veterinary science in Germany to give a comprehensive outline of the history of the founding and development of veterinary journals and veterinary schools. The pioneer veterinary periodical is the *Schweizer Archiv für Tierheilkunde*, founded in 1816, after which came, in 1828, the *Recueil de Médecine Vétérinaire* and the *Veterinarian* [the latter, contrary to Schmaltz's belief, having ceased publication in 1902]. The first German periodical was the unimportant *Deutsche Zeitschrift für die gesamte Tierheilkunde*, 1834, followed in 1835 by the excellent *Magazin für die gesamte Tierheilkunde*. The *Münchener tierärztliche Wochenschrift* began in 1849 as the *Tierärztliche Wochenblatt*, the *Berliner tierärztliche Wochenschrift* in 1888, the *Zeitschrift für Fleisch- u. Milch Hygiene* in 1891, the *Deutsche tierärztliche Wochenschrift* in 1892 and the *Tierärztliche Rundschau* in 1894.

The remaining articles are devoted to a sketch of the development of the veterinary schools up to 1888, preceded by a chronological list of schools found in other European countries. The names are given of all the teachers holding important posts in the veterinary schools at Berlin (founded 1790), Hanover (1778), Dresden (1780) (now Leipzig), Munich (1790), Giessen (1829), and Stuttgart (1821, closed 1912). These articles, packed with names and dates, could only be written by a man of the immense experience and wide knowledge possessed by Schmaltz, who has edited a veterinary weekly journal – the *Berliner tierärztliche Wochenschrift* – for 46 years, a unique achievement.—F. Bullock.

Arburua, J. M. (1934). **History of Veterinary Medicine in the United States.**—*J. Amer. Vet. Med. Ass.* **85.** 10-38. [19 refs.]

Campbell, D. M. (1934). **Development of Veterinary Medicine in North America. I. Introduction. II. The First Period – 1790-1850.**—*Vet. Med.* **29.** 48-52, 182-185, 226-228, 268-270, 310-312 and 352-354.

These independent contributions to American veterinary history are complementary, each author providing some information not given by the other. Arburua in the first article reaches the end of the first quarter of the 19th century, while Campbell in six articles is still dealing with the end of the 18th century. Both authors are working with scanty material, and both acknowledge their indebtedness to F. Smith's work. For this early period veterinary literature in America consisted to a great extent of reproductions of works by English authors. The articles are continuing.—F. Bullock.

Canham, A. S. (1933). **Watery Whites of Eggs. Report of Preliminary Investigations.**—*Onderstepoort J. Vet. Sci. & Anim. Indust.* **1.** 529-566. 19 figs., 2 tables, 8 graphs, 3 appendices.

The author, as a result of his investigations, came to the conclusion that candling is not a reliable method of determining whether an egg has a watery white or not. A watery-white egg may have a normal shell and a porous or thin-shelled condition may be found in normal eggs. Many watery-white eggs show excessive porosity of the shell. Brown eggs rarely have watery whites. Normal eggs kept for varying periods may develop watery whites. The author concludes, as a result of his research work, that a number of factors, all acting together or at times separately, may be responsible for the production of watery-white eggs. Such factors are warmth, vibration or movement, storage or age, and excessive porosity of shell in some cases. The strain of heavy laying over a considerable period may be a contributory factor.—E. M. Robinson.

OFFICIAL AND OTHER REPORTS.

Dominion of Canada. (1933). **Sixteenth Annual Report of the National Research Council.** pp. 113. Ottawa. [8vo].

The activities of the Council, which concerns itself with all branches of science, were curtailed somewhat during the year for financial reasons.

The new Institute of Parasitology at Macdonald College, Quebec, commenced operations under the directorship of Dr. T. W. M. Cameron. The objects and aims of the institute are set out. A survey of parasitic fauna of Canada is to be made and research into particular problems instigated. In this connection reference is made to the large liver fluke of ruminants, nodular disease of sheep in Quebec and the methods of control of the common strongyles of horses and ruminants.

Tuberculosis.—An associate committee composed of members from seven organizations in Canada reports on various aspects of tuberculosis. Reference is made to the work of the Federal Department of Agriculture, under Dr. E. A. Watson, on BCG vaccination of cattle. The net finding was that BCG confers some protection against natural tuberculosis in animals up to two years old, but not above that age.

The work of the University of Alberta is also mentioned. BCG has been applied by double inoculation intravenously and subcutaneously to 34 animals in tuberculous herds and to 50 young animals under experimental conditions. The final results are not yet available.

Other Diseases of Animals.—The associate committee on animal diseases reports on *Bact. pullorum* infection [bacillary white diarrhoea]. It is stated that details for the standardization of the agglutination test are nearly complete. A survey of various diseases was made and fowl paralysis was investigated.

A research information service is in operation for the benefit of research workers in Canada. This organization prepares bibliographies of specialized literature and, amongst matters of veterinary interest, bibliographies have been prepared by Miss E. M. Whalley on fowl paralysis, mastitis in cows, the Spahlinger vaccine, BCG vaccination and virus diseases.—J. E.

Federated Malay States. (1933). **Annual Report of the Veterinary Department for the Year 1932.** [Short, P. G.] *Federated Malay States Govt. Gaz.* Suppl. June 16th. pp. 9.

Straits Settlements. (1933). **Annual Report of the Veterinary Department for the Year 1932.** [Short, P. G.] pp. 9. Singapore: Govt. Printer. [fcp].

Mr. Short officiated as acting principal veterinary officer for both the Federated Malay States and the Straits Settlements. In addition there were nine British veterinary officers on duty during the year.

An animal census was made in the F.M.S. in 1932. The returns were:—369 horses, 45,538 cattle, 47,179 buffaloes, 90,336 sheep and goats, 139,336 pigs and 26,507 dogs. [For the census of the S.S. see this *Bull.* **3.** 222].

Animal Diseases.—The situation was very favourable, there being no bad outbreak during the year. Rinderpest was eradicated from the F.M.S. during the year. A few mild outbreaks of foot and mouth disease were observed and a number of cases were found in consignments of imported cattle when they were in quarantine. Swine fever gave little trouble. Sixty-three deaths occurred from haemorrhagic septicaemia and 34 from blackquarter in Perak State.

A heavy invasion of Australian sheep by coccidia caused an outbreak of diarrhoea with a mortality of 2 per cent.

Rabies was troublesome on account of the difficulty in instituting effective control. The measures adopted included the prohibition of import and export of dogs, compulsory muzzling, destruction of unlicensed and unmuzzled dogs and the destruction of all animal in-contacts. In the drive to carry out the third regulation, over 38,000 dogs were shot during the year. Prophylactic antirabies vaccination of dogs was carried out in certain suitable areas.

With regard to "dry coat" in horses, it is stated that a recovery of short duration follows a period of sojourn away from the plain at an altitude of 1,000 feet above sea level.

Animal Husbandry.—Pigs are numerically most important and are bred successfully, particularly by the Chinese. All classes of livestock and dairy products are imported in large quantities.

A long-felt want has been supplied by the formation of the Singapore dairy

farm, which is run on European lines : its herd consists of 69 cows, 24 calves and 3 bulls, all of good European breeds.—J. E.

Uganda Protectorate. (1933). **Annual Report of the Veterinary Department for the Year ended 31st December, 1932.** [Poulton, W. F.] pp. 44. 18 tables, 1 map. Entebbe : Govt. Printer. [fcp.] [3s.]

Staff.—The veterinary staff remained unchanged. It consisted of the director, two research officers and 12 officers engaged in disease control.

Diseases of Cattle.

Rinderpest.—A number of small outbreaks, which occurred during the year, are described. They were checked without great losses, chiefly by quarantine measures. Vaccine was employed to a small extent. Statistical information on the outbreaks of rinderpest is given in tabular form.

Trypanosomiasis.—Several outbreaks occurred in various parts of the Protectorate. In most cases they were caused by *Tryp. congolense*.

Contagious Bovine Pleuro-Pneumonia has been practically eradicated.

Anthrax.—Only one outbreak occurred, involving the death of 12 head of cattle.

Tuberculosis is rare in native cattle, except in the long-horned Ankole breed. Amongst 1,654 carcasses of this breed, 140 cases of tuberculosis were observed.

Tick-Borne Disease, "Makebbe."—A disease passing under this name causes mortality amongst calves to the extent of 10 to 15 per cent. Investigation has shown that "makebbe" includes East Coast fever, anaplasmosis and piroplasmosis.

Diseases of Other Animals.

There are short notes on contagious pleuro-pneumonia of goats, mange in goats, canine piroplasmosis, dog distemper, fowl typhoid and fowl pox.

Glossina Investigation.

The eradication work which was started in 1931 was continued with success ; [see the report for 1931, this *Bull.* **2**. 686]. The scheme consists in the systematic burning of grass annually with the object of destroying bush vegetation in which the fly congregates.

Education.

There is a five years' course of veterinary instruction for natives. The course of the work is described by the education officer [Carmichael, J.].

Animal Husbandry.

Overstocking occurs in a few small areas, but on the whole the Protectorate is understocked, the ratio of cattle per acre, excluding cultivated land, being 1 to 23. Meat and milk consumption is extremely low and this fact is a deterrent to an increase in stock-rearing. Stock improvement by elimination of "scrub" animals continued.

The export trade in hides and skins was depressed, owing to low values.

Notes are also given on the five experimental stock farms, on the ghee industry and on meat inspection. Livestock censuses are to be published triennially. There are none in this year's report.

A map of Uganda is given showing the slaughter stock routes, rinderpest outbreaks and the *Gl. morsitans* areas under investigation.—J. E.

Uganda Protectorate. (1933). **Annual Report, 1932, of the Veterinary Pathologist, Entebbe.** [Mettam, R. W. M.] *Ann. Rep. Vet. Dept., Uganda, 1932.* pp. 21-37. 5 tables.

The usual diagnostic returns are given in tables, also the dipping and abattoir returns.

Rinderpest.—Nearly 400 litres of serum were prepared by immunization of Ankole cattle by a single injection of serum and virus. The resultant antiserum was found to be remarkably potent. Jacotot's method of immunization intravenous inoculation into immune animals of 1 litre of citrated blood and the subcutaneous inoculation of spleen pulp—was tried. Results are not yet available. In connection with hyperimmunization, an investigation into blood groups in cattle was made, but no positive evidence was obtained.

A great deal of formalinized spleen pulp vaccine was prepared, but it turned out to be insufficiently potent for use in the field.

Nairobi Sheep Disease exists in Uganda, but no research was undertaken on it.

Heartwater was not observed during the year.

Trypanosomiasis, Piroplasmosis, Anaplasmosis and Theileriasis.—This section has been abstracted separately—see this *Bull.* **4.** 718.

Turning Sickness.—

"The most constant and noticeable symptoms are those that give the disease its name. Affected animals show turning or circling movements, a peculiar jerky gait, marked abduction of the hind limb, blundering into fixed objects, great depression and often progressive blindness. Appetite and rumination gradually decline. There is only a very moderate degree of fever. The course of the disease may be very rapid and animals may die within 48 hours after the first appearance of symptoms. Death occurs in over 90 per cent. of cases."

"The most remarkable post-mortem lesions are to be found in the central nervous system. The cerebro-spinal fluid is increased in amount and may be under considerable pressure. The meningeal vessels show acute stasis and large areas of the cortex often show extensive extravasations as the results of knocking the head against objects during life. Pin-point haemorrhages are commonly observed in the white matter of the cortex, hippocampus, corpus striatum, optic thalami and corpora quadragemina. Remarkable lesions are usually present in the roof and walls of the lateral ventricles. Haemorrhages varying in size from the merest speck up to a diffuse extravasation have been seen in the substance of the wall and roof of the ventricle ploughing into and disorganising the matter of the corpus callosum and corpus striatum. In one bullock there were large haemorrhages in the posterior quadrant of the ventricle. They were irregular in shape and measured 1·2 cm. long by 0·8 to 1 cm. in width. In the corpus callosum the haemorrhagic zone measured 4 cm. by 3 cm. ; it was irregular in shape and caused considerable disorganisation of the brain matter within the zone of the lesion. In every case the choroid plexus was very congested, a deep red in colour, and velvety to the touch."

Diseases of Swine.—An account is given of a serious disease occurring in 12 to 16-week-old pigs. The cause was not determined. The illness was acute and the mortality was very high. The chief *post-mortem* finding was acute gastro-enteritis, but in different animals this was limited to different parts. Pneumonia was always found in the more advanced cases. Nearly every animal examined had a heavy infestation with *Metastrongylus apri.*

Necrobacillosis occurred in ten young antelopes captured for research purposes [see this *Bull.* **3.** 530].

Fowl typhoid is common, but bacillary white diarrhoea is not known. Fowl pox occurs to a small extent.

Poisonous Plants.—Feeding tests were conducted with plants collected from grazing paddocks. Six were found to be poisonous.

Ecto- and Endoparasites.—The check-lists published in the report for 1931 are here supplemented by additional specimens identified. These include two trematodes, six cestodes, five nematodes and five ticks. It is stated that the

following ticks occur around Entebbe (in order of frequency) :–*Rhipicephalus appendiculatus*, *Boophilus decoloratus*, *Amblyomma variegatum*, *R. sanguineus* and *R. evertsi*.

The last four pages of the report are occupied by an appendix on tests made in 1931 and 1932 by W. H. Allan with vaccine against rinderpest. As stated earlier, this vaccine has not yet reached a satisfactory standard.—J. E.

Uganda Protectorate. (1934). **Annual Report of the Human Trypanosomiasis Research Institute for the Year ended 31st December, 1933.** [Duke, H. L.] pp. 11. Entebbe : Govt. Printer. [fcp] [1s.]

The year's work included enquiries into drug-resistant strains of *Tryp. rhodesiense*, a study of the Damba trypanosomes and tests on many strains of *T. gambiense*, *T. rhodesiense* and *T. brucei* as regards their susceptibility to human serum, their resistance to arsenicals and the duration of life of animals infected by them. The red cell adhesion test was used in experiments with blood from sheep and antelopes and for diagnosis in several cases of natural trypanosomiasis in man. Mention is also made of the role of antelopes as " carriers " of the trypanosomes infecting man, the susceptibility of various wild animals to human trypanosomes and various aspects of tsetse flies and glossinae as " carriers " of trypanosomes. —J. E.

Gold Coast Colony. (1934). **Report on the Department of Animal Health for the Year 1933-34.** [Stewart, J. L.] pp. 34. 5 tables, 1 map. Accra : Govt. Printer. [fcp] [2s.]

The European veterinary staff numbers five and, in addition, there are 16 native veterinary assistants. The year was notable for the fact that the plan of immunization against rinderpest in the northern territories was completed and there only remains the task of immunizing the fresh lot of young stock annually. The complete confidence of cattle owners has now been secured, a fact which has greatly assisted in the work of the department. Another scheme now well under way is the Native Administration Livestock Farm scheme, which was described in the previous year's report [this *Bull.* **4.** 75].

Rinderpest.—This has been eradicated from the Northern Territories, but risk of its re-introduction by cattle imported from the adjoining territory remains : it is, however, effectively checked at the quarantine stations and serum is used to protect in-contacts when cases are observed.

The method of immunization in the Northern Territories is the vaccine-double inoculation system (spleen vaccine followed in six days by serum and virus and after a further five days by virus alone). It is stated that succeeding generations of immunized cattle acquire an increased resistance.

The conditions in the coastal cattle-raising area [completely remote from the main cattle-raising area in the north] were, however, far less satisfactory, as in the previous year no immunization work was possible, though losses from rinderpest were severe. This year an immunization unit could be spared from the north and a start at block immunization was made at Accra : it is progressing well in spite of apathy of the cattle owners.

A few tests were made with goat-adapted virus, but the goats proved very susceptible to rinderpest and no diminution of virulence for cattle followed the goat passages.

Contagious Bovine Pleuro-Pneumonia is becoming relatively more important as rinderpest recedes, though it did not cause great loss during the year. Curasson's citrated and formalinized pleural exudate was used in a few

cases. A culture vaccine prepared by Bennett's [Sudan] method is being grown. An appreciable proportion of imported French trade cattle are found to be "lungers" at meat inspection.

Other Diseases.—Caseous lymphadenitis was found in about 10 per cent. of sheep at meat inspection.

Contagious bovine abortion was found by the agglutination test to be prevalent in several herds.

Forty horses infected with *Tryp. vivax* were successfully treated by tartar emetic or "antimosan" and several head of cattle similarly infected were cured by a new Bayer drug, "surfen C".

Notes on bovine piroplasmoses, anaplasmosis and theileriasis are also given.

Two cases of rabies in dogs were diagnosed.

Blue tongue and sheep scab were diagnosed for the first time in the Gold Coast.

Cysticercus bovis was found in 40 out of 209 cattle at meat inspection.

Fowl typhoid, fowl plague, and fowl spirochaetosis all caused great losses in poultry, and tuberculosis caused many deaths on one farm. "Atoxyl", "neosalvarsan" and "metarsenobillon" were all found to be efficacious against fowl spirochaetosis.

Work on Tsetse Flies.—One veterinary officer was detailed for this work and much progress was made in clearing areas of fly-infested country. It is thought that tsetse can be eradicated by cutting vegetation and small trees along the course of the Naboggo river at two points, just above its junction with the Volta river and near its own source; at the former site this will prevent repopulation of flies upstream from the Volta and, at the latter site, deprive the fly of suitable terrain. The middle part of the river is flooded in the rainy period; this drives off the fly which, normally, spreads over it again.

Several surveys of the fly were made by the use of screens to attract it, each screen being made of dark material measuring 2 by 4 ft., set up on the ground in the charge of a native boy, who catches the flies in a net as they alight on the screen. It has thus been found that *Glossina tachinoides* is the most common species and has a density 61 times greater than that of the other local species, *G. palpalis*.

Work on the examination of captured flies for trypanosomes was begun and seven out of 67 yielded positive results.

Animal Husbandry.—The estimated census of the livestock is:—172,000 cattle, 684,200 sheep and goats, 81,500 pigs, 4,340 horses and 16,030 donkeys. The position of the stock-rearing is described at length, with special reference to the West African Shorthorn, which is an excellent type and is disease-resistant.

—J. E.

Holland. (1934). Verslag aan den Minister van Economische Zaken omtrent de Werkzaamheden van den Veeartsenijkundigen dienst en den Gezondheidstoestand van den Veestapel in 1932. Departement van Economische zaken Directie van den landbouw. **[Report of the Veterinary Service for 1932].** [Berger, H. C. L. E.] pp. 94. 'S-Gravenhage: Alg. Landsdrukkerij. [8vo] [Fl. 1].

The health of livestock was good on the whole during the year.

Bovine Tuberculosis.—Of approximately 98,000 head of cattle of all ages tested with tuberculin during the year, nearly 18,000 reacted, giving an incidence of 18·25 per cent. (24 per cent. for animals over two years of age). In some urban districts the percentage of infection was well over 50 and in the northern country provinces it was below 10; this refers to animals over two years old.

BCG vaccination is used, chiefly by dairy companies, and the results are

generally favourable though cases of tuberculosis in vaccinated animals are not rare.

Foot and Mouth Disease is more or less enzootic in Holland and 10,000 farms were infected during the year. Passive immunization was employed to a small extent.

Notes are given on the other infectious diseases which commonly occur in European countries, but none of them caused any special loss. An outbreak of Aujeszky's disease occurred in cattle in south Holland. No cases of rabies were observed.

The returns of imports and exports of animals are given and the report concludes with a copy of the legal regulations governing the livestock industry passed during the year.—J. E.

Germany. (1934). Die Verbreitung von Tierseuchen und die Ergebnisse der Schlachtvieh- und Fleischbeschau im Jahre 1932. [**The Incidence of Animal Diseases and the Abattoir Returns for 1932**].—*Statistik Deuts. Reichs*. Vol. 444. pp. 113. Numerous tables. Berlin: Reimer Hobbing. [4to] [RM. 6·50].

The following notifiable diseases were not observed during the year :–dourine, rinderpest, contagious bovine pleuro-pneumonia and sheep pox. Other diseases notifiable in a part or whole of the German Reich are :–anthrax, blackleg, haemorrhagic septicaemia, strangles, tuberculosis, swine erysipelas, fowl cholera, glanders, foot and mouth disease, Borna disease, equine infectious anaemia, swine fever, swine plague, fowl plague, rabies, equine mange, bovine mange and sheep scab.

The incidence of the following diseases is given in tabular form to show geographical incidence and comparisons with previous years; the causes of the outbreaks are given, the methods of diagnosis, the methods of immunization and, in some cases, information on human infection from the outbreaks.

Anthrax.—There was a decrease in incidence, 1,000 cases of infection only being reported. Different kinds of vaccines and antisera were employed in various provinces. Over 50 cases of anthrax in human beings were notified.

Blackleg.—There was a decrease during the year and only 465 cattle and 42 sheep were dealt with.

Haemorrhagic Septicaemia was notified only in a few animals in Prussia and Hessen.

Strangles is notifiable only in East Prussia in which province 19 horses were found to be affected.

Tuberculosis.—The main information is given in several tables. The increase observed in 1931 was not continued, only 78,000 tuberculous cattle being reported during the year. The returns from the various provinces concerning the voluntary eradication scheme are given at great length. The scheme is gradually making progress and, according to the statistical information, nearly 350,000 farms participated. Of three million cattle on these farms a little over two million were examined and, of the latter, 42,000 cases of pulmonary, 1,800 cases of mammary, 400 cases of uterine and 38 cases of intestinal tuberculosis were discovered.

Swine Erysipelas showed an increase, 37,000 newly infected farms, with 59,000 affected pigs, being notified. Over 100 cases of swine erysipelas [*Erysipelothrix rhusiopathiae* infection] in human beings were observed. These were usually of the mild localized type of erysipeloid of the fingers, hands and arms.

Fowl Cholera caused some losses, most new outbreaks being traceable to importations from Poland.

Glanders was only observed in 17 horses on ten farms and in a few horses slaughtered for meat.

Foot and Mouth Disease showed a decrease over the previous year of nearly 30 per cent., according to the number of farms infected. In most cases infection broke out from previously infected animals and was transmitted at markets, etc. For control purposes antiserum was used to a certain extent, but in most cases "ringimpfungen" [serum immunization of all the cattle in a zone around the centre] was carried out.

A few cases of transmission to human beings are recorded and one case record is given, lesions observed being analogous to those occurring in cattle.

Borna Disease is notifiable in Württemburg and Hessen. In Württemburg there was a 58 per cent. decrease with 280 cases. No case was observed in Hessen. The disease is most common in the free state of Saxony, where nearly 500 cases occurred.

Infectious Equine Anaemia is only notifiable in Württemburg, where 241 cases occurred, a slight increase over the previous year. A few cases also occurred in Saxony and Hessen. Various methods of diagnosis are employed by different institutions. These include *post-mortem* examination, haematological tests [which are not described] and a serological test.

Swine Fever and Swine Plague.—These are considered together. They showed a 50 per cent. decrease over the previous year, only 12,500 cases being notified. The infection percentage of these diseases worked out at only 5·5 per 10,000 head of porcine stock.

Fowl Plague was only notified in 21 fowls on three farms.

Rabies.—110 cases, including infection of 97 dogs, occurred.

Mange.—Equine mange was notified on 22 farms, involving 602 horses. Mange in cattle was notifiable only in a small district in Prussia and Oldenburg. Some 200 cases occurred. Sheep scab continued to decrease, the number of infected farms being 82, and the number of affected sheep being about 6,000.

General.—In addition to the report on diseases, detailed information is given on the compensation paid for losses from diseases of animals, on the live-stock industry, including imports and exports, and on the meat inspection returns.

—J. E.

BOOK REVIEWS.

Mönnig, H. O. (1934). **Veterinary Helminthology and Entomology.** pp. xvi + 402. 264 figs., 12 plates. [111 refs.] London: Baillière, Tindall and Cox. [8vo] [30s.]

This is the first text book on the veterinary aspect of parasitology which has appeared in the English language since Flemming's translation of Neumann's "Parasites and Parasitic Diseases of Domesticated Animals," published in 1892, and McQueen's revised and enlarged edition which appeared in 1905. Great advance has been made during these 29 years and our knowledge of the subject has increased to such an extent as to necessitate its subdivision into the four distinct branches :—mycology, protozoology, entomology and helminthology, it being quite impossible for any one man to keep track of progress in every branch.

The book which is now under review deals with helminthology and entomology for the veterinarian and differs from the several recent works, which have been of a more technical nature, as the diseases caused by the various parasites are considered as well as the parasites themselves. All but the rarer and unimportant helminth and anthropod parasites of domestic animals and birds are considered, the list of hosts including the peafowl, ostrich, swan, and the fur-bearing animals, but not

the elephant, camel, water buffalo or other exotic beasts of burden. The greater part of its space is occupied by descriptions of species—a necessary feature of a book on this subject, since it is one of its most difficult and at the same time most essential aspects, the recognition of the parasite being the key to the diagnosis of the disease. This part is, however, reduced to the bare essentials ; in the helminth section it is enough for the determination of the species, and in some parts of the anthropod section a description of the genus is all that is attempted, the differentiation of the species of ticks, blowflies, glossinae and fleas being left to more highly specialized works. Where any parasite or group of parasites is responsible for a recognizable disease, the disease is dealt with separately under the headings :– " pathogenesis ", " symptoms ", " *post-mortem* examinations ", " diagnosis ", " treatment " and " prophylaxis ". Some readers may think that the author has not been quite critical enough about the pathogenicity of some of the parasites (a branch of the subject about which very little is known): one or a few moniezia are said to be capable of causing disease, and frequent reference is made to the production of substances harmful to the host as an explanation of pathogenic action. It is also noticed that no mention has been made of acute fascioliasis, a condition which at times may be very puzzling to veterinary practitioners in this country. A fuller account of what is known of the geographical distribution of the parasites might have been helpful and it is felt that a few more synonyms might have been given with advantage, and a list of the International Rules on Zoological Nomenclature with which not only veterinary students, but also students in biology seem to be by no means familiar.

The author of a book of this kind is, however, always faced with the problem of what to leave out in order to keep down the size and the expense of his publication and, taking that condition into consideration, this text-book must be regarded as a completely satisfying production. The balance between clear drawings, concise description and essential information on both the biological and the veterinary side of the subject has been wonderfully maintained, and a maximum of correct and up to date information is crammed into a minimum amount of space. It has appeared at a time when a students' guide is most needed in this country, and it should do much to help the teaching and the popularizing of a subject which during the past 20 years has suffered much through hazy classification and difficult nomenclature.—E. L. Taylor.

Jöhnk, M. (1934). Geburtshilfe beim Pferd. Beobachtungen und Erfahrungen eines Praktikers. **[Obstetrics in the Horse].** pp. 94. a few figs. and tables. Berlin : R. Schoetz. [8vo] [RM.4.40].

The author has been in country practice in Oldenburg, Germany for 26 years and this book is the outcome of his experience.

He gives systematic instruction on general obstetrics and on obstetrics relating to the mare, discussing the conditions causing dystocia and indicating how they are to be treated. Each condition is further illustrated by the incorporation of some of the author's case records in the text. Jöhnk also presents his experience in statistical form ; for example, anterior presentation was more than three times as frequent as posterior presentation and the corresponding viability figure for the foals was 20 per cent. and 10 per cent.

The author has rendered a valuable service to the veterinary profession by this record of his experience in this specialist field.—J. E.

AUTHOR INDEX

A

Abadie, P., 316.
Acevedo, R. A., 318, 470.
Achar, S. D., 494.
Achard, C., Boutaric, A., & Morizot, F., 45.
Acharya, C. N., 539.
Acharya, S. K., 110.
Ackert, J. E., Porter, D. A., & Beach, T. D., 40.
—. See Beach & Ackert, 40.
Acs, L., 219.
Adair, G. S. See Taylor, Adair & Adair, 760.
Adair, M. E. See Taylor, Adair & Adair, 760.
Adam. See Lesbouyries & Adam, 145 *bis*.
Adams, A. R. D., 510, 748.
—, & Lionnet, F. E., 341
Adant, M. See Bruynoghe & Adant, 11.
Addis, M., 65.
Adler, S., & Ellenbogen, V., 609.
Adsersen, V., 13, 516, 623.
Agapi, C. See Balteanu & Agapi, 694.
Agueci, A., 313.
Aïtoff, M., 696.
Ajwani, G. A., & Subbarayudu, M.V., 609.
Akerblom, E., 625.
Alano, S., 428.
Albiston, H. E., 505.
Albrecht, 435.
Albrecht, A., 15, 578.
Alcorn, L. M., 222.
Alessandrini, A. See Sanarelli & Alessandrini, 314, 639.
Alexander, J., 650.
Alexander, R. A., 32.
—, & Neitz, W. O., 350.
—. See du Toit, Alexander & Neitz, 347 *bis*.
Alexandresco, G. See Retterer & Alexandresco, 781.
Alexeieff, A., 365.
Alexieff, A. See Pappenheimer, Goettsch & Alexieff, 534.
Ali, M., 397.
Allcroft, W. M., & Godden, W., 768.
Allen, E. G. See Reifenstein, Allen & Allen, 42.
Allen, G. S. See Reifenstein, Allen & Allen, 42.
Allen, J. A., & Wardle, R. A., 662.
Alper, T., & Sterne, M., 488.
Altara, I., 145.
Ammitzboll, H., 681.
Ananiadès, B. See Stylianopoulos & Ananiadès, 221, 506.
Andersen, A., 675.
Anderson, A. B. See Hart & Anderson, 302.
Anderson, C., 227, 464.
—. See Nicolle & Anderson, 31.
Anderson, E. B., & Meanwell, L. J., 267.
Anderson, E. M. See Collip, Anderson & Thomson, 393.
Anderson, E. O. See Plastridge & Anderson, 406.
Anderson, G. W. See Johnson & Anderson, 317.
Andresen, F., 126.
Andrewes, C. H. See Smith, Andrewes & Laidlaw, 357.
Andrews, A. See Cunningham & Andrews, 770.
Andrews, J., 386, 564.
Andrews, W. H., 96, 328.
Andriejwski, P., 313.
Angelesco, J. See Combiesco & Angelesco, 355.
Angermann, W. See Kiessig & Angermann, 86.
de Apraiz y Buesa, L., 708.
Aragao, H. de B., 223.
Arburua, J. M., 788.
Arciniega, A., 527.
Armand-Delille, P., & Gavois, H., 89.
Armstrong, C., & Harrison, W. T., 442.
Arroyo, C. See Ruiz & Arroyo, 410.
—. See Vidal, Ruiz, Arroyo & Enríquez, 442 *bis*.
Arroyo Martín, C., 439.
Ascoli, A., 90.
Ashehov, I., 549.
Askew, H. O., 627.
—, & Rigg, T., 581.
—. See Rigg & Askew, 581, 772.
—. See Rigg, Askew & Kidson, 627.
Aston, B. C., 445.
Aubertin, E., & Reynes, V., 10.
Auchinachie, D. W. See Fraser, Godden & Auchinachie, 633.
Augustine, D. L., 42, 474.
Austin, P. R. See Evans, Simpson & Austin, 632.
Aynaud, M., 561.
Ayyar, L. S. P. See Rao & Ayyar, 38.

B

Baars, G., 771.
Babic, I., 578, 742.
Babin, A. See Goret, Babin & Camara, 499.
Bachlechner, K. See Henneberg & Bachlechner, 474.
Bachman, G. W., & Molina, R. R., 366.
—, & Rodriguez-Molina, R., 42.
Bachmann, W. See Steck, Bachmann, Kaestli & Gygax, 305.
Bachrach, M. D., & Pachomoff, V. J., 409.
Backlund, H. O., 662.
Bailly, J. See Remlinger & Bailly, 234 *quat*, 235 *sex*, 468 *bis*, 480, 572 *bis*, 731 *bis*, 782 *bis*.
—. See Remlinger, Rossi & Bailly, 468.
Baker, D. W., 751.
Baker, F. H. See Records, Vawter, Baker & Woodward, 616.
Baker, J. R., 452.
Ball, V., Zaessinger, J., & Martin, P., 669.
Balozet, L., 227, 338.
—, & Reynal, J., 460.
—, Cordier, G., & Ménager, J., 599.
—. See Nicolle & Bazolet, 429.
Balteanu, I., & Agapi, C., 694.
—, Toma, A., & Garaguli, A., 313.
Banerji, P. C., 615.
Bang, O., 34, 459.
—, Bendixen, H. C., & Orskov, J., 648.
Bareggi, G., 606.
Barlovatz, A., 341.
Barnes, M. F. See Fritz & Barnes, 604.
Barnett, L., 747.
Barr, M. See Glenny, Barr, Llewellyn-Jones, Dalling & Ross, 422.
Barrett, E. P., 172.
Barry, D. T., 278.
Bartels, 148.
Basset, J., 200 *ter*, 308 *bis*, 309, 601.
—, & Macheboeuf, M. A., 72.
—, & Moulin, A., 209.
Bauche, J. See Truche & Bauche, 318.
Baudet, E. A. R. F., 220,523.
—, & de Boer, E., 542, 774.
—, & Nieschulz, O., 471.
Baumann, R., & Weissmann, L., 734.
Baumgärtner, H., 624.
Bay, F., & Vogt-Moller, P., 675.
Baylis, H. A., 753.
Bayne-Jones, S., 491.
Bayon, H. P., 437.
Beach, T. D., & Ackert, J. E., 40.
—. See Ackert, Porter & Beach, 40.
Beard, J. W. See Rous & Beard, 784.
Beard, P. J., 241.
Beaton, W. G., 141.
Beattie, C. P., & Rice, R. M., 708.
Beaudette, F. R., Hudson, C. B., & Weber, A. L., 626.
Beaver, D. C., & Thompson, L., 652.
Becker, E. R., 508, 638.
—, & Hall, P. R., 338.
Becker, M., 548.
Beckett, E. F., 668.
Bédaride, 260.
Bedford, G. A. H., & Coles, J. D. W. A., 568.
Bedson, S. P., 165, 471.
Beerens, J., 701.
Behdjet, H., 426.
Beijers, J. A., 378.
Bellekens, A., 176.
Beller, 152.
Beller, K., 458, 653.
—, & Stockmayer, W., 97, 324.
—. See Zeller & Beller, 648.
Belschner, H. G., & Edgar, G., 620.
Bendixen, H. C., 93, 602.
—. See Bang, Bendixen & Orskov, 648.
Benesch, F., 194.
Benjamin, M. S. See Henry & Benjamin, 440.
Benner, J. W., 765.
Bennett, S. C. J., 29, 31, 223, 569, 591.
Bennetts, H. W., 213, 535, 607.
Ber, A., 484.
Berberian, D. A. See Turner, Berberian & Dennis, 363.
Berge, R., & Ekrem, A., 757.
—, & Schoop, G., 710.
Berger, H. C. L. E., 793.
Bergmann, G. See Ziegler & Bergmann, 305.
Berland, L., 80.
Bernad, M. See Goret, Bernad & Camara, 696.
Berndt, C., 276.
von Bertalanffy, L., 81.
Berthelon. See Lesbouyries, Dadot & Berthelon, 600.
Berthelon, M., 480.

Berthold, G., 663.
Bertrand, I., Carré, H., & Lucam, F., 670.
Besredka, A., 309.
Bethke, R. M. See Kick, Bethke & Edgington, 389.
Bevan, L. E. W., 233.
Beveridge, W. I. B., 711.
Beydemüller, 773.
Bhalerao, G. D., 38, 250 *bis*, 751.
Bice, C. M., 734.
Bickford, J. van A., 203.
Biely, J., & Roach, W., 95.
—, Palmer, V. E., & Lerner, I. M., 262.
Bier, O. G., 116.
Bierbaum, K., 293.
—, & Kayser, W., 734.
Bigger, J. W., 330.
Billa, M. See Courmont & Billa, 580.
Binns, D. See Myers, Muntwyler, Binns & Danielson, 292.
Birch, R. R., 647.
—. See Gilman, Milks & Birch, 704.
Birch, T. W., & Dann, W. J., 293.
Birch-Hirschfeld, L., 430.
Birkhaug, K. E., 369, 456, 486, 526.
—. See Douglas & Birkhaug, 676.
Bisanti, C., 321.
Bischoff. See Karsten & Bischoff, 419.
Bishop, L. M., 93.
—, & Fenstermacher, R., 334.
—. See Fitch & Bishop, 304.
Bishopp, F. C., 168.
Blacklock, D. B., 108.
Blackwood, J. H. See Stirling & Blackwood, 268.
Blain, C., 727.
Blaizot, P. See Ludovic & Blaizot, 515.
Blake, T. A. See Hopkirk, Marshall & Blake, 122.
Blakemore, F., 532.
Blanc, G., & Martin, L. A., 733 *ter*.
Blanchard, L., & Vedel, R., 353.
Bleecker, W. L., & Smith, R. M., 773.
Blickenstaff, P. H., 632.
de Blieck, L., & Jansen, J., 572.
Boak, R. A. See Carpenter & Boak, 159, 329.
Bock, H., 236.
Boddie, G. F., 638.
de Boer, E. See Baudet & de Boer 542, 776.
Bogdanoff, W. M., 770.
Böhmig, R., 368.
Boivin, A., & Mesrobeanu, L., 100.
Bolle, W., 698.
Bollman, J. L., & Schlotthauer, C. F., 547.
Boncinelli, U. See Reitano & Boncinelli, 431.
Bond, C. J., 679.
Bone, T., 686.
Bongert, J., 269.
Boquet, A., & Bretey, J., 369 *bis*.
—, & Ninni, C., 476.
—, & Saenz, A., 148, 309.
—, & Valtis, J., 369.
Bordas, F., 383.
Bordet, J., & Renaux, E., 44.
Borghi, B., 102, 103.
Borthwick, G. R., 409.
Bos, A., 29, 227, 613.
—. See Nieschulz & Bos, 736.
Bosman, V., & Botha, P. S., 676.
—. See Duerden, Bosman & Botha, 69.
—. See Duerden, Maré & Bosman, 676.
Bosnic, L., 503.
Bosworth, T. J., 600.
Botha, P. S. See Bosman & Botha, 676.
—. See Duerden, Bosman & Botha, 69.
—. See Duerden, Murray & Botha, 183.
Bouchet & Joly, 511.
Bouckaert, J. J. See Nélis & Bouckaert, 409.
Boughton, D. G., 339.
Bourguignon, G., 611.
Bourguignon, G. C., 460.
Boutaric, A. See Achard, Boutaric & Morizot, 45.
Bouyoucos, B., 230.
Boynton, W. H., 23.
—, & Woods, G. M., 566.
Bozicevich, J. See Wright, Bozicevich, Underwood & Schaffer, 275.
Bradley, B., 248.
Braga, A., & Faria, A., 655 *bis*.
Brandly, C. A. See Scott & Brandly, 395.
Brassey-Edwards, H. H., 142, 634.
Brazier, M. A. B., 397.
Braun, H., & Guggenheim, K., 18.
Breaux, R. P. See Sebrell, Dean, Elvove & Breaux, 181.
Breed, F., 668.
Breidert, 433.
Bresler, C. P., 549.
Bressot, E., 111.
Bretey, J., 256.
—. See Boquet & Bretey, 369 *bis*.
—. See Ninni & Bretey, 151, 204.
Bridré, J., 104.
Brocq-Rousseu, & Roussel, G., 131.
Brooke, R. O., Smith, A. H., & Smith, P. K., 629.
Brooks, A. G. See Shortt & Brooks, 656.
Brooks, E. B., 538.
Broom, J. C., & Findlay, G. M., 348.
Brosch, J. See Gerlach, Segre & Brosch, 206.
Brotzu, G., 699.
Brown, H. C., 162.
Brown, J. H., 407.
—. See Paulson & Brown, 154.
Brown, J. M., Savage, A., & Robinson, A. D., 118.
Brown, M. H. V. See Thomas & Brown, 262.
Browning, C. H., Cappell, D. F., & Gulbransen, R., 720.
Brownlee, A., & Wilson, D. R., 105.
—. See Gordon, Brownlee, Wilson & MacLeod, 105, 106.
Brownlie, J. L., 482.
Brueckner, A. L. See Everson, Poelma, Brueckner & Pickens, 502.
—. See Poelma, Everson, Brueckner & Pickens, 579.
Bruhn, W., 783.
Brumpt, L. See Erhardt & Brumpt, 386.
Brundza, A., 779.
Brune, C. See Dubois & Brune, 528.
Bruner, D. W., 650.
Brunett, E. L., 356.
Bruns. See Willfuhr, Frommer & Bruns, 485.
Brunschwik, M., 667 *bis*.
Brunzema, D., & Kauffmann, F., 700.
Bruynoghe, R., & Adant, M., 11.
Bryan, C. S., 453, 538.
Bubbermann, C., 691.
—, & Kraneveld, F. C., 663.
Buchanan, R. E., 161, 335.
Büchli, K., 323.
Buck, J. M. See Cotton, Buck & Smith, 156 *bis*, 329.
Buck, M., 506.
Buckley, J. J. C., 435, 751 *bis*.
Bueucamino, V., 342.
Bühlmann, J., 457.
Bull, L. B., & Dickinson, C. G., 499.
Bunce, E. H., 583.
Bunyea, H. See Delaplane, Stuart & Bunyea, 262.
Burghardt, 170.
Burke, V., & Gibson, F. O., 336.
Burn, C. G., 712 *bis*.
Burnet, F. M., 256 *bis*, 358.
—, & Ferry, J. D., 574.
—, & Galloway, I. A., 726.
Burrows, W., 99.
Busch, G., 487.
Butler, A. M. See Wyman & Butler, 54.
Butler, C. See Sewall, de Savitsch & Butler, 313.
Butler, C. G. See Varley & Butler, 37.
Butler, G. G. See Stevenson & Butler, 239.
Butler, W. J., & Warren, D. M., 417.
Butozan, V. See Rajcevic & Butozan, 444.
Butterfield, C. T., 784.
Buxton, J. B., & Glover, R. E., 476.
Buxton, P. A., 72.

C

Cabassu, H. See Giraud & Cabassu, 103, 426, 569.
Caccavella. See Schwetz, Els & Caccavella, 725.
Caillot, 618.
Calmette, A., 87.
—, et al., 205.
—, Weil-Hallé, B., Saenz, A., & Costil, L., 701.
Camara, A. See Goret, Babin & Camara, 499.
—. See Goret, Bernad & Camara, 696.
Cameron, H. S., 705.
—, Fincher, M. G., & Gilman, H. L., 341.
Cameron, R. See Rettger, Plastridge & Cameron, 415.
Cameron, T. W. M., 110, 245, 742.
Caminopetros, J., 464, 722, 759.
—, Phaloukis, J., & Contos, B., 470.
Campana, R., 457.
Campbell, D. M., 531, 788.
Canham, A. S., 788.
Cappell, D. F. See Browning, Cappell & Gulbransen, 720.
Cariati, M., 730.
Carmichael, J., 487, 610.
Carneiro, V. See Pacheco & Carneiro, 447.
Carlström, B., 667.
Carnus. See Marcenac & Carnus, 511.
Carougeau, 275.
Carpano, M., 574.
Carpenter, C. M., & Boak, R. A., 159, 329.
Carpenter, H. M., & Long, P. H., 396.
Carr, F. H., & Jewell, W., 290.
Carré, H., 532.
—. See Bertrand, Carré & Lucam, 670.
Carrieu & Lafenêtre, 124.
Casserly, T. L. See Clark, Casserly & Gladish, 568.
Catanel, A. See Sergent & Catanel, 162.
Cauchemez, L., 518.
Cavalli, M. See Ottaviani & Cavalli, 287.

Cazaux. See Cuille, Chelle & Cazaux, 608.
Cernianu, C., 609.
—, & Popovici, I., 210.
Cerruti, C., 316.
Cerruti, C. F., & Cremona, P., 418.
Césari, E. See Cotoni, Césari & Chambrin, 307.
Chadwick, C. R. See Machattie, Mills & Chadwick, 362.
Chaillot, & Millisher, 458.
Chaillot, L., & Saunié, L., 175.
Chamberlin, W. E. See Seddon & Chamberlin, 545.
Chambers, F., 772.
Chambrin, N. See Cotoni, Césari & Chambrin, 307.
Champy, C., 781.
Chandler, W. L. See Mallmann & Chandler, 786.
Chapron, H., 623.
Chatelain, M. P., 626.
Chatron, M., 744.
Chelle. See Cuillé, Chelle & Cazaux, 608.
Chen, H. T., 743.
Cherrington, V. A., Hansen, H. C., & Halversen, W. V., 305.
Ch'in, K. Y. See Hu & Ch'in, 612.
Chin, S. J. See Ko & Chin, 710.
China, W. E., 244.
Chitwood, B. G., 755.
Chlusszow, K. See Herrmann & Chlusszow, 732.
—. See Herrmann, Chlusszow, Lipatow & Dmitriew, 703.
Chorine, V. See Marchoux & Chorine, 343, 724.
—. See Marchoux, Leroy & Chorine, 162.
Chorley, C. W., & Swynnerton, C. F. M., 490.
Choufour, J. C., 98, 208.
Christian, M. I. See Mattick, Hiscox & Christian, 267.
Christiansen, C., 70.
Christl, H., 237.
Chu, F. T. See McKhann & Chu, 256.
le Chuiton, F. See Moureau & le Chuiton, 343.
Ciaudo, P. See Giraud & Ciaudo, 723.
Cilli, V., 206.
Cinotti, F., 440.
Ciuca, A., 568 *bis*.
Clapham, P. A., 129, 364.
—. See Morgan & Clapham, 751.
Clarenburg, A., 261.
—, & van Heelsbergen, T., 160, 334.
—. See Heelsbergen & Clarenburg, 94.
Clark, F. A. See Frank, Clark, Haskell, Miller, Moss & Thomas, 55.
Clark, H. C., Casserley, T. L., & Gladish, I. O., 568.
Clark, R., 262.
Claude, A., 398.
—, & Murphy, J. B., 671.
Clavel, J. See Sédallian & Clavel, 764 *bis*.
Clawson, A. B., 447, 539.
Clawson, B. J., 368.
Clay, H. H., 81.
Clay, J. See Harris, Clay, Hargreaves & Ward, 289.
Clough, G. W., 272.
Coban, S. See Parhon, Coban & Fastlich, 282.
Cobbett, N. G. See Mitchell & Cobbett, 109, 244.
Cocksedge, T. A. B., 759.
Cohn, M. L., 202.
Cole, S. W., 196.
Coleman, M. B. See Gilbert & Coleman, 14.
Coles, A. C., 738.
Coles, J. D. W. A., 386, 567.
—. See Bedford & Coles, 568.
—. See Robinson & Coles, 102.
Colin, F., 275.
Collin, R., & Drouet, P. L., 681.
Collip, J. B., Anderson, E. M., & Thomson, D. L., 393.
Comandon, J., & de Fonbrune, P., 614.
Combiesco, D., 431, 737.
—, & Angelesco, J., 355.
Comte, G. See Villian & Comte, 396.
Condrea, P., & Roth, H., 395.
—, & Poenaru, H., 258 *bis*.
Conner, B. V. See Johnson & Conner, 380.
Constantinesco, V. See Nicolau, Mathis & Constantinesco, 236.
Conti, G., 346.
Contos, B. Caminopetros, Phaloukis & Contos, 470.
Cook, J. W., Dodds, E. C., & Greenwood, A. W., 679.
—, —, Hewett, C. L., & Lawson, W., 679.
Cooley, R. A., 618.
Cordier, G., & Ménager, J., 24, 25, 224, 486.
—, & Ménager, M., 609.
—. See Balozet, Cordier & Ménager, 599.
Corkill, T. F., 581.
Coronel, A. B., 225, 734.
Corson, J. F., 610, 719, 720, 721.
Cort, W. W., 40.
d'Costa, J., 401, 552.
—, & Singh, B., 429, 615.
da Costa, S. F. G., 127.
Costil, L. See Saenz & Costil, 93, 204.
—. See Calmette, Weil-Hallé, Saenz & Costil, 701.
Cotoni, L., Césari, E., & Chambrin, N., 307.
Cotton, W. E., Buck, J. M., & Smith, H. E., 156 *bis*, 329.
Couch, J. F., 778.
Courmont, P., & Billa, M., 580.
Courrier, R., & Kehl, R., 281.
Cousi, D., 168 *bis*.
Cousins, H. H., 186.
Coutelen, F. See Hoare & Coutelen, 224.
Couture, E. See Rochaix & Couture, 601.
—. See Rochaix, Tapernoux & Couture, 601.
Cowdry, E. V., 239.
Cox, G. A. See Whitehead & Cox, 302.
Cox, H. R., Syverton, J. T., & Olitsky, P. K., 353.
—. See Olitsky, Cox & Syverton, 616.
—. See Syverton, Cox & Olitsky, 352.
Coyne, F. P., 219.
Craighead, A. C. See Shortt, Malone, Craighead & McGuire 656.
Cram, E. B., & Cuvillier, E., 753.
—, & Wehr, E. E., 753.
Crawford, M., 191, 592.
Crawford, W., 615.
Creech, G. T., 499.
—, & Miller, F. W., 249.
Cremona, P., & Monaco, R., 387.
—. See Cerruti & Cremona, 418.
Crew, S. K., Culhane, K., & Underhill, S. W. F., 587.
Critien, A., 460.
Crochet, A., & Rodieux, M., 16.
Cross, F. See Newsom & Cross, 17, 733 *bis*.
Crowe, H. W., 199.
Csontos, J., & Nyiredy, I., 732.
Cuboni, E., 782.
Cuillé, & Darraspen, 507.
—, Chelle & Cazaux, 608.
Culhane, K. See Crew, Culhane & Underhill, 587.
Cumings, J. N., 291.
Cumming, W. M., 153.
Cummings, S. L., & Weatherall, C., 497.
Cummins, S. L., & Evans, A. C., 172.
Cunningham, A., & Andrews, A., 770.
Cunningham, I. J., 289, 630.
Curasson, G., 126, 615, 678, 725, 731.
—, & Didier, L., 354.
Curson, H. H., 36 *bis*.
Cushing, E. C., & Patton, W. S., 576.
Cuthbertson, A., 577.
—. See Lawrence & Cuthbertson, 741.
Cuvillier, E. See Cram & Cuvillier, 753.

D

Dabrowska, W., 69.
Dacey, H. G., & Korovin, N., 706.
Dadot. See Lesbouyries, Dadot & Berthelon, 600.
Dahlberg, A. C., 583.
Dahmen. See Zwick, Ernst & Dahmen, 699.
Dalal, N. P. See Row, Dalal & Gollerkeri, 180.
Dale, H. H., 56.
Dalling, T. See Montgomerie & Dalling, 333.
—. See Glenny, Barr, Llewellyn-Jones, Dalling & Ross, 422.
Danielson, W. H. See Myers, Muntwyler, Binns & Danielson, 292.
Danks, W. B. C., 35.
Dann, A. T., 544.
Dann, W. J. See Birch & Dann, 293.
Darling, F. F. See Orr & Darling, 530.
Darraspen. See Cuillé & Darraspen, 507.
Darrou, 61.
Dart, R. A., 294.
Dartigues, 781.
Darzine, E., 11.
Datta, S. C. A., 112, 399, 550, 746 *bis*.
—, & Rajagopalan, V. R., 615.
Daubney, R., 113, 491.
—, & Hudson, J. R., 469.
Davenport, C., 292.
Davies, G. O., 535.
—. See Gaiger & Davies, 124, 266, 481 *bis*.
Davies, W., 634.
Davis, D. J., 53.
—. See Pilot & Davis, 407.
Davtjan, E. A., 754.
Dawbarn, M. C., & Farr, F. C., 548.
Day, H. B., 303.
Dayus, C. V., & Hopkirk, C. S. M., 95, 414.
Deambrogio, L., 312, 374.
Dean, H. T. See Sebrell, Dean, Elvove & Breaux, 181.
Dearstyne, R. S. See Greaves, Dearstyne & Gauger, 601.
Débonera, G. See Mélanidi, Tzortzaki & Débonera, 230.

Debono, J. E. See Zammitt & Debono, 16.
Dehmel, H. See Wolters & Dehmel, 201.
van Deinse, F. See Valtis & van Deinse, 456.
—. See Valtis, Paisseau & van Deinse, 476.
Delafield, M. E., 762.
Delanoë, P., 31.
Delaplane, G. F., 629.
Delaplane, J. B., & Stuart, H. O., 342.
Delaplane, J. P., Stuart, H. O., & Bunyea, H., 262.
Delas, R., 284.
Delez, A. L., 346.
Dennis, E. W. See Turner, Berberian & Dennis, 363.
Derrick, G. W., 86.
Détrez, G., 49 *ter*.
Dettling, H., 15.
Dhingra, D. R., 630.
Dias, F., 28 *ter*.
Dickinson, C. G., 94.
—. See Bull & Dickinson, 499.
Didier, L. See Curasson & Didier, 354.
Dieckmann, H., & Mohr, H., 314.
Dienes, L., 117.
—, & Mallory, T. B., 116.
Diernhofer, K., 97, 198, 217.
Dikmans, G., 101, 336, 566, 755.
Dimitrijevic-Speth, V., 448.
Dimock, W. W., & Edwards, P. R., 120, 174, 408.
Dindinaud, R. M. E., 95.
Dingle, J. H., & Weinzirl, J., 204.
Dinischiotu, G. T. See Popper, Teitel-Bernard & Dinischiotu, 115 *bis*.
Djaenoedin, R. See Kraneveld & Djaenoedin, 215, 469, 503, 510, 732.
Djourichitch, M. See Ramon & Djourichitch, 442.
Dmitriew, A. See Herrmann, Chlusszow, Lipatow & Dmitriew, 703.
Doak, B. W., 627.
Dobberstein, J., 767.
—, & Paarmann, E., 767.
—, & Piening, C., 649, 767.
Dodds, E. C., 679.
—. See Cook, Dodds & Greenwood, 679.
—. See Cook, Dodds, Hewett & Lawson, 679.
Doenecke, H. See Oppermann & Doenecke, 454.
Doer, R., & Menzi, E., 474.
Dold, H., 199 *bis*, 293.
Donat, F. See Kofoid & Donat, 103.
Donatien, A., & Lestoquard, F., 165.
—, —, Sausseau, E., & Maubaret, P., 713.
—. See Parrot, Donatien & Lestoquard, 576.
—. See Sergent, Donatien, Parrot & Lestoquard, 506, 566.
Donham, C. R., & Fitch, C. P., 325, 326.
—. See Fitch & Donham, 603 *bis*.
Dorner, W., 495.
Dorset, M., 641.
Douglas, R. G., & Birkhaug, K. E., 676.
Doutre, E. See Dubois & Doutre, 528.
—. See Dubois, Doutre & Hugon, 579.
Drouet, P. L. See Collin & Drouet, 631.
Dry, F. W., 393, 491.
Dryerre, H., 122.
Dubois, C., 173, 211, 329, 528, 579.
—, & Brune, C., 528.
—, & Doutre, E., 528.
—, —, & Hugon, P., 579.
Dubovsky, H., 161.
Duerden, J. E., & Palmer, E. W., 183.
—, Bosman, V., & Botha, P. S., 69.
—, Maré, G. S., & Bosman, V., 676.
—, Murray, C. A., & Botha, P. S., 183.
Dugué, J. M. See Malbrant & Dugué, 463.
Duguid, J. F. See Husband & Duguid, 626.
Duke, H. L., 36, 102, 163 *bis*, 425, 443, 509, 510, 659, 792.
Dukes, H. H., 557.
Dunkin, G. W., 372.
Dunn, J. T., 626.
Dunn, L. H., 27 *bis*, 741.
Duran, A. See Kraus & Duran, 33.
Durand, P., 430, 470.
Dwolaizkaya-Baryschewa, K. M., & Kagan, N. W., 45.
Dyleff, P., 27.

E

Eagles, G. H., 737.
Eastwood, A., 373.
Ecker, E. E. See Weed & Ecker, 57, 445.
Eckles, C. H. See Wayne, Eckles & Peterson, 133.
Eddie, B. See Meyer & Eddie, 357, 736 *ter*.
Edelmann, R., 403, 702.
Edgar, G., 620.
—. See Belschner & Edgar, 620.
Edgington, B. H. See Kick, Bethke & Edgington, 389.
Edwards, J. T., 376.
Edwards, P. R., 12 *bis*, 303, 408 *bis*, 694, 709.
—. See Dimock & Edwards, 120, 174, 408.
Edwards, S. J., 303, 693.
—. See Minett, Stableforth & Edwards, 197.
Egehoj, J., 628 *bis*.
Ehrlich, 54.
Eichhorn, A., & Lyon, B. M., 498.
Eilmann, H., 667.
Eisenberg, K. B., 184.
Ekrem, A. See Berge & Ekrem, 757.
Elford, W. J., & Galloway, I. A., 348.
—, & Todd, C., 519.
Elkeles, A. See Friedemann & Elkeles, 665, 768.
Ellenbogen, V. See Adler & Ellenbogen, 609.
Els. See Schwetz, Els & Caccavella, 725.
Elsdon, G. D., & Stubbs, J. R., 583.
Elsner, E., 756.
Elton, C. See Findlay & Elton, 350.
Elvidge, A. R., 64.
Elvove, E. See Sebrell, Dean, Elvove & Breaux, 181.
Emeric, P., 58.
Emmel, M. W., 11.
Emmerson, M. A., 447.
Emsbo, P., & Plum, N., 695.
Endrejat, E., 271.
Engelbrecht, M. A. See Frost & Engelbrecht, 407.
Enríquez, C. S. See Vidal, Ruiz, Arroyo & Enríquez, 442 *bis*.
Ephrussi, B. See Plotz & Ephrussi, 238.
Erhardt, A., 386.
—, & Brumpt, L., 386.
—, & Orgel, D., 745.
Erismann, H., & Saxer, E., 623.
Ernst. See Zwick, Ernst & Dahmen, 699.
van Es, L., 151.
Essex, H. E. See Schlotthauer, Essex & Mann, 342.
Etinger-Tulczynska, R. See Neufeld & Etinger-Tulczynska, 146.
Evans, A. C., 166, 302.
—. See Cummins & Evans, 172.
Evans, H. M., Gustus, E. L., & Simpson, M. E., 548.
—, Simpson, M. E., & Austin, P. R., 632.
Evans, S. A., 297.
Eveleth, D. F., 587.
Everson, C. L., Poelma, L. J., Brueckner, A. L., & Pickens, E. M., 502.
—. See Poelma, Everson, Brueckner & Pickens, 579.
Eyraud, 720.

F

Fabiani, G. See Pinoy & Fabiani, 639.
Fagot, 559, 700.
Fairbairn, H., 510.
Fairley, K. D. See Kellaway & Fairley, 111.
Fairweather, D. S., 331.
Falchetti, E., 9.
Faria, A. See Braga & Faria, 655 *bis*.
Farr, F. C. See Dawbarn & Farr, 548.
Fastlich, G. See Parhon, Coban & Fastlich, 282.
Favia, N. See Spinelli & Favia, 606.
Fearon, W. R., 692.
Feced, R., 549.
Feemster, R. F., & Wells, W. F., 358.
Fejgin, B., & Prokopowicz-Wierzbowska, M., 153.
Feldman, W. H., 255, 699.
—, & Mann, F. C., 20.
—, & Olson, C., Jr., 606 *bis*, 624, 704.
Feng, L. C., & Hoeppli, R., 742.
—. See Hoeppli & Feng, 358, 365.
Fenstermacher, R., & Jellison, W. L., 479.
—. See Bishop & Fenstermacher, 334.
Ferry, J. D. See Burnet & Ferry, 574.
Fiat, N. See Kligler, Komarov & Fiat, 356.
Fiessinger, N., 403.
Fildes, P., & Knight, B. C. J. G., 335.
—. See Knight & Fildes, 17.
Fincher, M. G. See Cameron, Fincher & Gilman, 341.
Findlay, C. M., 737.
Findlay, G. M., 469.
—, & Elton, C., 350.
—. See Broom & Findlay, 348.
Finkelstein, M. H., 475.
—. See Mackie, van Rooyen & Finkelstein, 763.
—. See Schwentker, Rivers & Finkelstein, 350.
Fiore, F., 282.
Fischl, V., Kotrba, J., & Singer, E., 774.
—. See Singer & Fischl, 774.
Fish, E. W., 49.

Fisher, L. W. See Mellon, Richardson & Fisher, 201.
Fitch, C. P., & Bishop, L. M., 304.
—, & Donham, C. R., 603 *bis*.
—. See Donham & Fitch, 325, 326.
Fleischhauer, G., 104, 179.
Flexner, S., 294.
Florey, H., 67.
Flückiger, G., 454.
Folger, A. F., 35, 669.
de Fonbrune, P. See Comandon & de Fonbrune, 614.
Fooy, J. P., 121.
—. See Kalgis & Fooy, 645.
Forestier, A. C., 575.
de Fosset, A. J., 11.
Foster, A. O., 40.
Fox, H., 559.
Franchini, J., 426.
Francke, G., Standfuss, R., & Schunke, P., 611.
Franco, E. E., 426.
Frank, L. C., Clark, F. A., Haskell, W. H., Miller, M. M., Moss, F. J., & Thomas, R. C., 55.
Franklin, M. C., 629.
Fraser, A. H. H., & Robertson, D., 751.
—, Godden, W., & Auchinachie, D. W., 633.
—, —, & Thomson, W., 264.
Frauchiger, E., 480.
Freeman, M. See Holden & Freeman, 547.
Frei, W., 680.
Friedemann, U., 769.
—, & Elkeles, A., 665, 768.
Freixas, P. M., 421.
Frency, M. R., 38.
French, M. H., 288.
Fresdorf, E., 454.
Freund, L., 245, 471.
Friedman, E. See Laporte & Friedman, 499.
Fridenson, A. See Girard, Sandulesco, Fridenson & Rutgers, 67.
Friedlander, R. D. See McCoy, Miller & Friedlander, 366.
Fritsche, K. See Lerche & Fritsche, 624.
Fritz, B. S., & Barnes, M. F., 604.
Fritzsche, K. See Lerche & Fritzsche, 533.
Froger, 773.
Fröhlich, E., 734.
Fromme. See Willfuhr, Fromme & Bruns, 485.
Frost, W. D., 53.
—, & Engelbrecht, M. A., 407.
Fry, E. G. See Wolff, Riegel & Fry, 276.
Fry, R. M., 597.
Frye, W. W. See Meleney & Frye, 228.
Frykholm, N., 450.
Fujino, T. See Taniguchi, Hosokawa, Kuga & Fujino, 682.
Fukushima, T., 355, 519.
—, & Isskiki, O., 714.
—, & Shimomura, K., 518.
Fukusho, K. See Nakamura, Oyama, Fukusho & Tomonaga, 518.
Fulton, A., 466.
Fulton, M. See Schaeffer & Fulton, 185.
Furth, J., 380.

G

Gaggermeier, G., 170 *bis*.
Gaiger, S. H., & Davies, G. O., 124, 266, 481 *bis*.
Galea, M., 513 *quat*.
Galliard, H., 26, 225, 720.
Galli-Valerio, B., 245.
Gallo, F. See Mallmann & Gallo, 158.
Galloway, I. A. See Burnet & Galloway, 726.
—. See Elford & Galloway, 348.
Ganslmayer, R., 586.
Garaguli, A. See Balteanu, Toma & Garaguli, 313.
García, I., 750.
Garner, W., 83.
Garrault, H., 182.
Garrod, L. P., 218.
Gätjen, 406.
Gauger, H. C. See Greaves, Dearstyne & Gauger, 601.
Gavois, H. See Armand-Delille & Gavois, 89.
Gehring, K., & Murray, C., 613.
Geiger, J. C., & Gray, J. P., 771.
Geiger, W., 515.
—. See Uhlenhuth, Meissner & Geiger, 180.
Genevray, J. See Legroux & Genevray, 207.
Gerlach, F., 258, 725.
—, Segre, S., & Brosch, J., 206.
Germain. See Plazy & Germain, 431.
Geweniger, 301.
Gibbs, C. S., 240, 520 *bis*.
Gibson, F. O. See Burke & Gibson, 336.
Gilbert, R., & Coleman, M. B., 14.
Gildemeister, E. See Zeller, Gildemeister & Hilgers, 355.
Gill, D. A., 16, 393, 461.
—. See Hopkirk & Gill, 124.
Gillespie, H. B. See Rettger & Gillespie, 335.
Gilman, H. L., & Milks, C. H., 332.
—, —, & Birch, R. R., 704.
—. See Cameron, Fincher & Gilman, 341.
Gilroy, E. See Mackie, van Rooyen & Gilroy, 212.
Gilruth, J. A., 121, 291, 634.
Giltner, L. T., & Shahan, M. S., 351, 427 *bis*.
Giordano, A., 722.
Girard, A., 394.
—, Sandulesco, G., Fridenson, A., & Rutgers, J. J., 67.
Giraud, P., 426.
—, & Cabassu, H., 103, 426, 569.
—, & Ciaudo, P., 723.
Gladish, I. O. See Clark, Casserly & Gladish, 568.
Glässer, 232, 267.
Glenny, A. T., Barr, M., Llewellyn-Jones, M., Dalling, T., & Ross, H. E., 422.
Glover, R. E., 476, 518, 599.
—. See Buxton & Glover, 476.
Gloyne, S. R., 43, 385.
Glud, P., Pedersen-Bjergaard, K., & Portman, K., 182.
Gluschke, A., 58.
Gminder, A., 698.
—, & Sickmüller, E., 150.
Godden, W. See Allcroft & Godden, 768.
—. See Fraser, Godden & Auchinachie, 633.
—. See Fraser, Godden & Thomson, 264.
Godet, 49.
Goettsch, M. See Pappenheimer, Goettsch & Alexieff, 534.
Goffinet, L., 61.
Gofton, A., 299.
Gogolka, K. H., 578.
van Goidsenhoven, C., 318.
Goldie, H., 292, 682.
Gollerkeri, G. V. See Row, Dalal & Gollerkeri, 180.
Golowin, A. D. See Pokschischewsky & Golowin, 147.
Golowitzina, K. A., 45.
Gonzaga, A. C. See Sampson, Gonzaga & Hayden, 284.
Gorchowa, E. L. See Tzechnowitzer, Gorchowa & Moldavskaja-Kritschewskaja, 22.
Gordon, H. McL., 251 *bis*, 518, 619.
—. See Ross & Gordon, 524.
Gordon, J., 475, 597.
—, & Knox, J. C., 763.
Gordon, W. S., 729.
—, Brownlee, A., Wilson, D. R., & MacLeod, J., 105, 106.
—. See MacLeod & Gordon, 106.
Goresline, H. E., 489.
Goret, P., & Zeitoun, E., 371.
—, Babin, A., & Camara, A., 499.
—, Bernad, M., & Camara, A., 696.
Gorini, C., 484.
Goto, Y. See Konno & Goto, 500 *bis*.
Götze, R., 544, 666, 739, 787.
—, & Liess, J., 666.
Gould, G. N., Jr., & Morgan, K. G., 777.
Gousseff, W. F., 222, 424.
—. See Yakimoff & Gousseff, 714.
—. See Yakimoff, Gousseff & Rastegaïeff, 337.
—. See Yakimoff, Gousseff & Matikaschwili, 161.
—. See Yakimoff, Gousseff & Nezwetaïeff, 22.
—. See Yakimoff, Gousseff, Mezwetaieff & Rastegaïeff, 564.
Gowen, J. W., & Schott, R. G., 476, 625.
van der Graaf, J., 263.
Graham, E., 553.
Graham, N. P. See Ross & Graham, 274, 540.
Graham, N. P. H. See Kauzal & Graham, 524.
Graham, R. See Thorp & Graham, 155, 324.
—. See Slatter, Park & Graham, 674.
Granata, G., 370.
Grant, R., 282, 630.
Grasset, E., 273.
Gratia, A., & Linz, R., 116 *bis*.
Gratzl, E., 448 *bis*.
Gräub, E., 653.
Gray, H., 113.
Gray, J. D. A., 15, 332.
Gray, J. P. See Geiger & Gray, 771.
Greaves, R. E., Dearstyne, R. S., & Gauger, H. C., 601.
Green, R. G., Katter, M. S., Shillinger, J. E., & Hanson, K. B., 349.
Green, W. J., 255.
Greenwood, A. W. See Cook, Dodds & Greenwood, 679.
Grenoilleau, 460.
Griffith, A. S., & Munro, W. T., 7.
—, & Summers, G. J., 201.
Grillo, J., 226.
Grimard-Richard, L. See Nattan-Larrier & Grimard-Richard, 426, 723.
—. See Nattan-Larrier, Nouguès & Grimard-Richard, 723.
Grimm, G., 785.
Groenewald, J. W., 131.
—. See du Toit, Malan & Groenewald, 68.
Grosser, O., 65.
Grossman, H., 146.
Grudzien, S., 622.
Guérin, M. See Oberling & Guérin, 177.

Guerrero, R. P., & Patino, F. P., 506.
Guggenheim, K. See Braun & Guggenheim, 18.
Guilbert, H. R. See Hart & Guilbert, 625.
—. See Hart, Mead & Guilbert, 381.
Guillot, G., & Pigoury, L., 207.
Guiseppe, C. N., & Sicilia, G., 386.
Gulbransen, R. See Browning, Cappell & Gulbransen, 720.
Gunnison, J. B., 649.
Gunn, J. A., 82.
Gurevitch, J. See Olitzki & Gurevitch, 420.
Gustus, E. L. See Evans, Gustus & Simpson, 548.
Gutstein, M., 100.
Gwatkin, R., 211, 502.
Gygax, E. See Steck, Bachmann, Kaestli & Gygax, 305.

H

Haddow, J. R., 400, 418, 551.
—, Sen, K. C., & Roy, A. C., 571.
Hadenfeldt, A. See Seelemann & Hadenfeldt, 407, 497, 597.
Hadley, F. B. See Hart, Hadley & Humphrey, 14.
Haines, R. B., 384 *bis*.
Haler, D. H., 495.
Hall, G. N., 74, 345.
—. See Thomson & Hall, 608.
Hall, G. N. A., 140.
Hall, M. C., 618, 715.
Hall, P. R. See Becker & Hall, 338.
Hall, W. W., & Scott, B. V. D., 710.
Hallaver, C., 519.
Hallman, E. T., & Witter, J. F., 315.
Halversen, W. V. See Cherrington, Hansen & Halversen, 305.
Hamann, E. E. See Huddleson, Johnson & Hamann, 327.
Hämel. See Horster & Hämel, 44.
Hammond, J., 376.
Handschin, E., 522.
Hansen, H. C. See Cherrington, Hansen & Halversen, 305.
Hanson, K. B., 127.
—. See Green, Katter, Shillinger & Hanson, 349.
Happe, H., & Neumark, E., 324.
Harbou, J., 437, 766.
Hardenberg, J. G., 769.
Hardt, O., 488.
Hare, T., 120, 344.
Hargreaves, F. J. See Harris, Clay, Hargreaves & Ward, 289.
Harnach, R., 91, 148, 640.
van Harreveld, A. See Kok & van Harreveld, 125.
Harrington, E. L., 71.
Harris, L. J., Clay, J., Hargreaves, F. J., & Ward, A., 289.
Harris, M. See Loebel, Shorr, Richardson & Harris, 412 *bis*.
Harrison, L. W., 683.
Harrison, W. T. See Armstrong & Harrison, 442.
Harshfield, G. S. See Roderick, Harshfield & Merchant, 582.
Hart, E. B., Hadley, F. B., & Humphrey, G. C., 14.
Hart, G. H., & Guilbert, H. R., 625.
—, Mead, S. W., & Guilbert, H. R., 381.
Hart, P. D., & Anderson, A. B., 302.
Hartwigk, H., 210.
—. See Rautmann & Hartwigk, 497.
Haschen, E., 738.
Haskell, W. H. See Frank, Clark, Haskell, Miller, Moss & Thomas, 55.
Hassall, A., & Potter, M., 167.
Haupt, H., 301, 321, 378.
—. See Klimmer & Haupt, 3 *bis*.
Havens, L. C., & Mayfield, C. R., 236.
Hawking, F. See Yorke, Murgatroyd & Hawking, 243.
Hayden, C. E. See Sampson, Gonzaga & Hayden, 284.
Hayes, F. M., 704.
Hayne, T. B. See Kerr & Hayne, 108.
Hazemann, R. H. See Taylor & Hazemann, 159.
Hedley, O. F. See Stimson & Hedley, 178.
Hedström, A., 762.
Hedström, H., 411, 644.
van Heelsbergen, T., & Clarenburg, A., 94.
—. See Clarenburg & van Heelsbergen, 160, 334.
Heger, R., 543.
Hegner, R., 614.
Heimann, F., 135.
Heizmann, E., 71.
Heller, H. H., 600.
Helm, R., 8, 487.
—, & Wedemann, W., 541.
Hemmert-Halswick, A., 85.
Henderson, D. W., 213.
Henderson, E. W. See Patterson, Wilcke, Murray & Henderson, 439.
Henderson, J., 80.
Henderson, W. W., 73, 138.
Henkels, P., 542.
Henneberg, O. H., 384.
—, & Bachlechner, K., 474.
Henning, M. W., 79.
Henrard, C. See van Hoof & Henrard, 340, 610.
Henrici, A. T. See Novak & Henrici, 220.
Henrici, M., 289.
Henry, A., 539.
—, & Masson, G., 364, 565.
Henry, B. S., 158 *bis*.
Henry, M., 552, 727.
—, & Benjamin, M. S., 440.
Henschien, J., 488.
Herbstreith, H. See Seifried & Herbstreith, 729.
d'Herelle, F., & Rakieten, T. L., 738.
Hernandez, F. S., & Vara, G. G., 415.
Herrmann, O., & Chlusszow, K., 732.
—, Mirsabekjan, A., & Megrabjan, R., 707.
—, Chlusszow, K., Lipatow, L., & Dmitriew, A., 703.
Herzberg, K., 658.
Hewett, C. L. See Cook, Dodds, Hewett & Lawson, 679.
Hewitt, J. A., 164.
Hilgers, P. See Zeller, Gildemeister & Hilgers, 355.
Hill, A. B., 529.
Hill, M., & Parkes, A. S., 632.
Hill, W. H., King, H. M., & Laird, D. G., 260.
Hillerbrand, N., 462.
Hindersson, R., 642, 658.
Hindle, E., 565, 652.
—, & White, P. B., 723.
Hindmarsh, W. L., 512.
Hinshaw, W. R., & Taylor, T. J., 317.
Hinz, W., 107.
Hirato, K., 457.
Hirsch, W., 331.
Hiscox, E. R. See Mattick, Hiscox & Christian, 267.
Hisel, C. C., 641.
Hjärre, A., 670.
Hlavaty, A., 655.
Hoare, C. A., 508.
—, & Coutelen, F., 224.
Hodge, B. E., & Swift, H. F., 368.
van der Hoeden, J., 322, 502, 604.
Hoeppli, R., & Feng, L. C., 358 365.
—. See Feng & Hoeppli, 742.
Hof, W., 344.
Hofbauer, J. See Pelczar & Hofbauer, 174.
Hoflund, S., 378.
—. See Stalfors & Hoflund, 282.
Hohn, J., 9.
Holdaway, F. G., 619.
Holden, H. F., & Freeman, M., 547.
Hole, N., 543.
Hollande, A. C., & Penn, J., 526.
Holmdahl, G., 387.
Holness, H. J., 609.
Holstein, 228, 717.
Holth, H., 559, 562, 646, 758.
Holzapfel, C. R. See du Toit, Malan, Louw, Holzapfel & Roets, 289.
Homedes, J., 750.
von Höne, 633.
van Hoof, L., 443.
—, & Henrard, C., 340, 610.
Hoogland, H. J. M., 220.
Hopkirk, C. S. M., 197, 581.
—, & Gill, D. A., 124.
—, Marshall, D., & Blake, T. A., 122.
—. See Dayus & Hopkirk, 95, 414.
Horder, T., 154.
Hornby, H. E., 223, 295.
Horster, & Hämel, 44.
Hosokawa, M. See Taniguchi, Hosokawa, Kuga & Fujino, 682.
Houthuis, M. J. J., 10.
Howe, P. R. See Wolbach & Howe, 265.
Howitt, B. F., 730.
Hoyt, A., 422.
Hruska, C., 696.
Hruska, K., 640, 695.
Hu, C. H., 612.
—, & Ch'in, K. Y., 612.
Huber, F. L., 454.
Huck, W., 672.
—, & Möller, J., 271.
Hucker, G. J., 4, 304, 305.
—, & Lee, D. A., 57.
—, Trudell, F., & Jennings, W. S., 5.
Hudack, S. See McMaster & Hudack, 135.
Huddleson, I. F., 494.
Huddleson, I. P., Johnson, H. W., & Hamann, E. E., 327.
Hudson, C. B., 302.
—. See Beaudette, Hudson & Weber, 626.
Hudson, J. R. See Daubney & Hudson, 469.
Huet, M., 39.
Hughes, T. P. See Irwin & Hughes, 254.
Hugon, P. See Dubois, Doutre & Hugon, 579.
Hulphers, G., 168.
Hultén, O., 128.
Humphrey, G. C. See Hart, Hadley & Humphrey, 14.
Hunter, A. H., 414.
Hupbauer, A., 654, 655.
—, & Lugomer, V., 764.
Hupka, E., & Meier, K., 387.
Huri, M., 329.
Hurst, C. C., 402.

Hurst, E. W., 349.
Husband, A. D., & Duguid, J. F., 626.
Hsu-Hsi-Fan, 252.

I

Ilmjarv, M., 438.
Imes, M., 431.
—. See Schwartz, Imes & Wright, 367.
Ipoustéguy, P. See Velu, Zottner & Ipoustéguy, 24, 542.
Irwin, M. R., 253.
—, & Hughes, T. P., 254.
Isskiki, O. See Fukushima & Isskiki, 714.
Ives, L. D., 436.
Ivy, A. C., 629.
Iwanoff, K., 455, 756.
Iwanoff-Gobzem, P. S., 714.

J

Jack, R. W., 242 *bis*, 359.
Jackson, C. H. N., 520, 660 *bis*.
Jahnel, F., 724.
James, L. H., 215.
Jansen, J. See de Blieck & Jansen, 572.
Jardon, M. See Trensz & Jardon, 225.
Jay, R., 744.
Jarosch, R., 622.
Jekel, F., 549.
Jelen, G. D., 523.
Jellison, W. L., & Philip, C. B., 358.
—. See Fenstermacher & Jellison, 479.
—. See Philip & Jellison, 618.
Jennings, W. S. See Hucker, Trudell & Jennings, 5.
Jensen, C. O., 416, 555.
Jensen, E. See Jensen & Jensen, 676 *ter*.
Jensen, E. A., 740.
Jensen, K. A., 152.
Jensen, V., 682.
—, & Jensen, E., 676 *ter*.
de Jesus, Z., 659, 754.
Jewell, W. See Carr & Jewell, 290.
Jezic, J., 200.
—, & Kodrnja, E., 580.
Jiménez Ruiz, M. J., 444.
Jöhnk, M., 215, 796.
Johnson, E. P., & Anderson, G. W., 317.
—, & Conner, B. V., 380.
Johnson, H. W. See Huddleson, Johnson & Hamann, 327.
Johnson, R.E. See White, Johnson, Plastridge & Reece, 325.
Johnson, W. T., 21.
Johnstone, R. N., 239.
Joly. See Bouchet & Joly, 511.
Jones, E. R., 464.
Jones, F. S., 378.
—, & Little, R. B., 85, 257 *bis*.
—. See Little & Jones, 198.
Jones, L. L., 777.
Jonnesco, D., 657, 731.
Jordan, J., 310.
Jordan, L., 642.
Jordan, L. E., 89.
Jorge, R., 431.
Josland, S. W., 586.
Joyeux, C., & Piéri, J., 430.
Józkiewicz, M., 622.
Jullien, J., 330.
Junack, M., 319, 697.
Jundell, I., & Magnusson, H., 413, 414.
Jungherr, E., 308.
—, & Plastridge, W. N., 155.
Jungherr, E. L., 160.
Juranic, A., 673.
Jusatz, H. J., 70.

K

van der Kaay, F. C., 181.
Kagan, N. W. See Dwolaizkaya-Baryschewa & Kagan, 45.
Kalgis, J. A., & Fooy, J. P., 645.
Kalikin, B., 645 *ter*.
Kamalow, N., 231.
Kammel, & Riedel, 55.
van der Kamp, C. J. G., 504.
Kaneko, K. See Saisawa, Taise & Kaneko, 340.
Kaplan, L. See Kaplan & Kaplan, 396.
Kaplan, M. L., & Kaplan, L., 396.
Karger, W., 543.
Karkadinowskaja, I. A. See Makkawejski, Karkadinowskaja & Micheew, 323.
Karmann, P., & Presch, L., 337.
—, & Wierhoff, F., 283.
Karsten, 157, 211, 319, 371, 489.
—, & Bischoff, 419.
Kästli, P., 406.
—. See Steck, Bachmann, Kästli & Gygax, 305.
Katayama, N., 226.
Katter, M. S. See Green, Katter, Shillinger & Hanson, 349.
Kauffmann, F., 7.
—. See Brunzema & Kauffmann, 700.
Kaupp, B. F., 84.
Kauzal, G., 251.
—, & Graham, N. P. H., 524.
Kayser, W. See Bierbaum & Kayser, 734.
Keane, J. S., 507.
Kehl, R. See Courrier & Kehl, 281.
Kelland, P. J. L., 188.
Kellaway, C. H., & Fairley, K. D., 111.
Keller, H., 310.
Kelley, C. D., 674.
Kelser, R. A., 107, 194.
Kennedy, W., 590.
Kerl, W., 698.
Kernkamp, H. C. H., 177, 681.
Kerr, J. A., & Hayne, T. B., 108.
Kerr, W. R. See Lamont, Kerr & Shanks, 560.
Kessler, E., 59.
Keylock, H. E., 346.
Kick, C. H., Bethke, R. M., & Edgington, B. H., 389.
Kidson, E. B. See Rigg, Askew & Kidson, 627.
Kieferle, F., 285.
Kiessig, W., & Angermann, W., 86.
Kilduffe, R. A., 758.
Kind, G. G., 571.
King, H. M. See Hill, King & Laird, 260.
Kinsley, A. T., 514, 668.
Kirchenbauer, H., 600.
Kitselman, C. H., 329, 757.
Klarenbeek, A., & Voet, J., 30.
Kleiber, M., 187.
Klich, P., 525.
Kligler, I. J., Komarov, A., & Fiat, N., 356.
Klimmer, M., 477.
—, & Haupt, H., 3 *bis*.
Klisiecki, A., Pickford, M., Rothschild, P., & Verney, E. B., 63.
Klobouk, A., 466 *ter*, 467.
von Knebel, 543.
Knight, B. C. J. G. See Fildes & Knight, 335.
Knight, C. J. G., & Fildes, P., 17.
Knobloch, E., 331.
Knorpp, 161.
Knowlton, M., 270.
Knox, J. C. See Gordon & Knox, 763.
Ko, R., & Chin, S. J., 710.
Köbe, K., 573.
Koch, W., 680.
de Kock, G., 6.
Kodama, M., & Kono, M., 470.
Kodama, T., 520.
Kodrnja, E. See Jezic & Kodrnja, 580.
Koffman, M., 229.
Kofoid, C., & Donat, F., 103.
Kohout, J., 119.
Kok, D. J., & van Harreveld, A., 125.
Kolbe, F., 433.
Kolbe, L., 667.
Komarov, A. See Kligler, Komarov & Fiat, 356.
Komarow, S. A., 134.
Kon, P. M., 270.
Kondo, S., & Nakamura, N., 735.
Konnó, M., & Pieraerts, G., 509.
Konno, T., & Goto, Y., 500 *bis*.
—, & Zaizon, K., 500.
Konrich, F., 448.
Koov, A., 128.
Kopciowska, L. See Nicolau & Kopciowska, 34, 730.
Korenchevsky, V., 376.
Korkhaus, R., 361, 744.
Korovin, N. See Dacey & Korovin, 706.
Köser, 458.
Köser, A. See Micssner & Köser, 323.
Koser, S. A. See Swingle & Koser, 396.
Kotlán, A., 425.
—, & Pospesch, L., 21.
Kotrba, J. See Fischl, Kotrba & Singer, 774.
Kovács, J., 548.
Kowanz, R., 409.
Král, F., 511.
Krallinger, H. See Zorn, Krallinger, Schneider & Schott, 187.
Kramm, 418.
Kraneveld, F. C., 216 *bis*, 503.
—, & Djaenoedin, R., 215, 469, 503, 510, 732.
—. See Bubbermann & Kraneveld, 663.
Krasovsky, W. K. See Popow, Kudrjavcew & Krasovsky, 278.
Kraus, R., & Duran, A., 32.
Krause, C., 195.
Krause, M. See Kunert & Krause, 718.
Krediet, G., 438, 481, 531.
Krijgsman, B. J., 523.
—, & Ponto, S. A. S., 108.
—, & Windred, G. L., 577.
Krishnan, K. V., & Lal, J. C., 229.
Krizenecky, J., 632.
Kröner, W., 700.
Kropf, R., 62.
Kross, W., & Zuelzer, M., 30.
Krueger, 786.
Krug, E. F., & Rohdenburg, G. L., 64.
Krüger, H., 515.
Krzywanek, F. W., 390.
Kucera, C., 777 *bis*.
Kudrjavcew, A. A. See Popow, Kudrjavcew & Krasovsky, 278.
Kuga, S. See Taniguchi, Hosokawa, Kuga & Fujino, 682.
Kuhlmann, H., 350.
Kuhn, W. R., 681.
Kunert, H., & Krause, M., 718.
—, & Kunzmann, T., 721.

Kunzmann, T. See Kunert & Kunzmann, 721.
Küst, 548, 613.
—, & Struck, M., 678.
—, & Vogt, 783.
Kuttner, A. G., & Zepp, H. D., 320.

L

Labedz, M., 658.
Lachenschmid, B., 525.
Lachner, H., 757.
Lafenêtre. See Carrieu & Lafenêtre, 124.
Lagaillarde, 59, 511.
Lagerlöf, N., 780.
Lahaye, J., & de Saint Moulin, L., 734.
Lahiri, B. N. See Shortt & Lahiri, 656.
Laidlaw, P. P. See Smith, Andrewes & Laidlaw, 357.
Laird, D. G. See Hill, King & Laird, 260.
Laja, F., 117, 124.
Lal, J. C. See Krishnan & Lal, 229.
Lamarre, L., 353.
Lambin, S. See Régnier & Lambin, 785.
Lamborn, W. A., 449.
Lamont, H. G., Kerr, W. R., & Shanks, P. L., 560.
Lancefield, R. C., 190.
Lander, G. D., 388.
Landsteiner, K., & van der Scheer, J., 764.
Lane, C., 246.
Lange, Bruno, 92.
Lange, L., 88.
Langerman, A., 605.
Langeron, M., 692.
Langkilde, K., 455.
Langrishe, J. du P., 398.
Laothr, & Szidat, U., 472.
Lapidas, H. See Wohlfeil, Sauerzapfe & Lapidas, 136.
Laporte, A., & Friedman, E., 499.
Laporte, R., 526.
Largeau, R. See Sainton & Largeau, 781.
Laroche, G., 496.
Larrieu, L., 157, 501 *bis*.
Larsen, E., 53.
Larsson, A. R., 777.
Lash, E., 756.
Lashley, K. S., 184.
Launoy, L., 225, 611.
—, & Prieur, M., 225.
Lawrence, D. A., & Cuthbertson, A., 741.
Lawrence, M. B. See Seastone & Lawrence, 19.
Lawson, G. B., & Stinnett, M. S., 701.
Lawson, W. See Cook, Dodds, Hewett & Lawson, 679.
Leasure, E. E., 654.
Lebasque, 711.
Leclainche, E., 86, 374 *bis*, 478.
Lecomte de Noüy, P., 115.
Leczycka, E. See Sierakowski & Leczycka, 462.
Ledingham, J. C. G., 725.
Leduc, 327.
Lee, D. A. See Hucker & Lee, 57.
Legendre, R., 489.
Legezynski, S., & Rafinski, K., 706.
Legg, J., 221, 505.
Legroux, R., 373.
—, & Genevray, J., 207.
Lehr, L., 129.
Leighton, G., 403.
Leiper, R. T., 742.
Lemétayer, E., 353.
—. See Ramon & Lemétayer, 114, 372.
Lemierre, A., 316.
Lena, D. See Pieri & Lena, 570.
Lenfield, J., 426.
Lenkeit, W., 631.
Lentz, W., 306.
Lenzte, F. A. See Lerche & Lenzte, 331.
Lépine, P. & Valtis, J., 9.
Lepiney, L., 134.
Lerche, & Fritzsche, K., 533, 624.
—, & Lenzte, F. A., 331.
Lerew, W. M., 109.
Lerner, I. M. See Biely, Palmer & Lerner, 262.
Leroy, R. See Marchoux, Leroy & Chorine, 162.
Lesbouyries, & Adam, 145 *bis*, 307.
—, Dadot & Berthelon, 600.
Leslie, A., 78, 264, 441, 582.
—. See Morrison & Leslie, 359.
Lester, H. M. O., 463.
Lestoquard, F., & Savance, P., 162.
—. See Donatien & Lestoquard, 165.
—. See Parrot, Donatien & Lestoquard, 576.
—. See Donatien, Lestoquard, Sausseau & Maubaret, 713.
—. See Sergent, Donatien, Parrot & Lestoquard, 506, 566.
Letard, E., 435.
Levaditi, C., & Schoen, R., 229.
—, Ravaut, P., & Levaditi, J., 166.
—, —, Vaisman, A., & Schoen, R., 166.
Levaditi, J. See Levaditi, Ravaut & Levaditi, 166.
Lewis, E. A., 241.
Lewis, I. M. See Swearingen & Lewis, 336.
Lewkowitsch, E. N. See Yakimoff, Matikaschwili & Lewkowitsch, 161.
—. See Yakimoff, Matikaschwili, Rastegaïeff & Lewkowitsch, 337.
Lewkowitsch, F. E. N. See Yakimoff & Lewkowitsch, 339.
Leyhausen, 104.
Li, H. C., 113.
Lichtenstein, S., 201.
Liddo, S., 606.
Liebscher, W., 395.
Liess, J. See Götze & Liess, 666.
Lièvre, H., 363.
Lignières, J., 233, 430, 501, 512 *ter*, 513, 653 *bis*.
Lilleengen, K., 779.
Lillie, R. D., 357.
Lines, E. W. L., 545.
Linon, G., 429.
Linton, R. G., 556, 784 *bis*.
Linz, R. See Gratia & Linz, 116 *bis*.
Lionnet, F. E., 687.
—. See Adams & Lionnet, 341.
Lipatow, L. See Herrmann, Chlusszow, Lipatow & Dmitriew, 703.
Lisbonne, M., & Vidal, L. F., 460.
Little, R. B., & Jones, F. S., 198.
—. See Jones & Little, 85, 257 *bis*.
Liverani, E., 153.
Livesay, H. R., 422.
Livingston, A. E. See Schmidt & Livingston, 276 *ter*.
Llewellyn-Jones, M. See Glenny, Barr, Llewellyn-Jones, Dalling & Ross, 422.
Lloyd, D. C., 766.
Lloyd, L., 243.
Lloyd, W. E., & Macpherson, A. M. C., 172.
Lobel, L. W. M., 458.
Lockau, U., 118.
Lockhart-Mummery, J. P., 596.
Loebel, R. O., Shorr, E., Richardson, H. B., & Harris, M., 412 *bis*.
Logie, H. B., 637.
Lombardo-Pellegrino, P., 98.
Lommatzsch, R., 42.
Long, P. H., & Muellerschoen, B., 18.
—. See Carpenter & Long, 396.
Lopatynski, K., 644.
López, A. H., 415.
Lorenzen, P., 3.
Lörincz, F., 747.
—, & Szentkirályi, Z., 576.
Lotze, H., 314.
Lourens, L. F. D. E., 239, 690.
Louw, J. G. See du Toit, Malan, Louw, Holzapfel & Roets, 289.
Lozano, L., 410.
Lübke, A., 501.
Lucam, F. See Bertrand, Carré & Lucam, 670.
Lück, W., 672.
Lucker, J. T., 43.
Ludovic, & Blaizot, P., 515.
Lugomer, V. See Hupbauer & Lugomer, 764.
Lührs, 744.
Lührs, E., 169, 434.
Lurie, M. B., 203.
Luy, P., & Schmitt, J., 68.
Lwoff, A., 164.
Lwoff, M., 464.
Lyon, B. M. See Eichhorn & Lyon, 498.
Lyon, W. E., 196.
Lytle, W. H., 121.

M

van der Maas, D., 215.
Maass, Z. I., 253.
McBryde, C. N., 727.
McBurney, R., 385.
McCarrison, R., & Madhava, K. B., 59.
McClure, F. J., 389.
McCordock, H. A., & Muckentuss, R. S., 358.
McCoy, O. R., Miller, J. J., & Friedlander, R. D., 366.
McCulloch, E. C., 676.
Macdonald, R. A. S., & le Roux, P. L., 62.
McEwen, A. D., 214, 451.
—, & Roberts, R. S., 755.
M'Fadyean, J., 19, 117.
McGaughey, C. A., & Whitehead, R., 430.
McGowan, J. P., 441.
McGuire, J. P. See Shortt, Malone, Craighead & McGuire, 656.
MacHattie, C., Mills, E. A., & Chadwick, C. R., 362.
Macheboeuf, M. A. See Basset & Macheboeuf, 72.
McIlnay, J. N., 327.
McIntosh, A., 659.
McIntosh, R. A., 52.
McKenzie, F. F., & Phillips, R. W., 631.
Mackerras, M. J., 522.
McKhann, C. F., & Chu, F. T., 256.
Mackie, T. J., van Rooyen, C. E., & Finkelstein, M. H., 763.
—, —, & Gilroy, E., 212.
MacLeod, J., 105.
—, & Gordon, W. S., 106.
—. See Gordon, Brownlee, Wilson & MacLeod, 105, 106.
McMaster, P. D., & Hudack, S., 135.
McMurray, M. R. See Parkhurst & McMurray, 382.

Macnaughten, L., 83.
McNutt, S. H., 704.
—, & Walsh, F. E., 604.
—, —, & Murray, C., 341.
Macpherson, A. M. C. See Lloyd & Macpherson, 172.
Macy, H. See Wayne & Macy, 133.
Madhava, K. B. See McCarrison & Madhava, 50.
Magallon, P., & Vidal, L. F., 98.
Magens, H. J., 674.
Magnusson, H., 322, 782.
—. See Jundell & Magnusson, 413, 414.
Magri, B., 125.
Makkawejski, W. N., Karkadinowskaja, I. A., & Micheew, N. I., 323.
Malan, A. I. See du Toit, Malan & Groenewald, 68.
—. See du Toit, Malan, Louw, Holzapfel & Roets, 289.
Malbrant, R., & Dugué, J. M., 463.
Malkani, P. G., 112, 261, 362.
Mallmann, W. L., & Chandler, W. L., 786.
—, & Gallo, F., 158.
Mallory, T. B. See Diense & Mallory, 116.
Malone, R. H. See Shortt, Malone, Craighead & McGuire, 656.
Malou, A., 43.
Mangold, E., 62 *bis*.
Manley, F. H., 14, 733.
Mann, F. C. See Feldman & Mann, 20.
—. See Schlotthauer, Essex & Mann, 342.
Mannucci, E., 162.
Manson-Bahr, P., 137, 421.
Manwell, R. D., 776.
Marais, I. P. See Mönnig & Marais, 674.
Marcandier, & Pirot, R., 431.
Marcenac, & Carnus, 511.
Marchand, E. See Varenne & Marchand, 514.
Marchlewski, L., & Urbanczyk, W., 135.
Marchoux, E., & Chorine, V., 343, 724.
—, Leroy, R., & Chorine, V., 162.
Maré, G. S. See Duerden, Maré & Bosman, 676.
—. See Quinlan, Maré & Roux, 132, 631.
Marotel & Vitu, 363.
Marr, D. M., 212.
Marsh, H., 120, 207.
Marshall, D. See Hopkirk, Marshall & Blake, 122.
Marshall, E. K., Jr., 628.
Martensson, J., 782.
Martin, A. R., 762.
Martin, C. L., 356.
Martin, L. A. See Blanc & Martin, 733 *ter*.
Martin, P. See Ball, Zaessinger & Martin, 669.
Martin, R. K., 102.
Martínez, C. R., 509, 529.
Marvell, A., 544.
Masheter, J. W. H., 176.
Mason, E., 490.
Mason, J. H., 422.
Mass, I. Z., 252.
Masson, G. See Henry & Masson, 364, 565.
—. See Panisset & Masson, 57.
Maternowska, I., 749 *bis*.
Mathews, F. P., 778.
Mathis, C. See Nicolau, Mathis & Constantinesco, 236.
Matikaschwili, I. See Yakimoff & Matikaschwili, 21 *quat*.
Matikaschwili, I. L. See Yakimoff, Gousseff & Matikaschwili, 161 *bis*.
—. See Yakimoff, Matikaschwili, Rastegaïeff & Lekowitsch, 337.
Mattick, A. T. R., Hiscox, E. R., & Christian, M. I., 267.
Mattill, H. A. See Olcott & Mattill, 587.
Maubaret, P. See Donatien, Lestoquard, Sausseau & Maubaret, 713.
Mayfield, C. R. See Havens & Mayfield, 236.
Mead, S. W. See Hart, Mead & Guilbert, 381.
Meanwell, L. J. See Anderson & Meanwell, 267.
Meerson, I. S., 64.
Megrabjan, R. See Herrmann, Mirsabekjan & Megrabjan, 707.
Mehl, S., 111.
Meier, K. See Hupka & Meier, 387.
Meinicke, E., 760.
Meinicke, H., 217.
Mejlbo, E., 461, 668.
Mélanidi, C., Tzortzaki, N., Débonera, G., 230.
Meleney, H. E., & Frye, W. W., 228.
Mellanby, J., 283.
Mellanby, M., 49.
Mello, A., 441.
Mellon, R. R., 201.
—, Richardson, R. D., & Fisher, L. W., 201.
Mempel, S. See Teichmann & Mempel, 417.
Ménager, J. See Cordier & Ménager, 24, 25, 224, 486.
—. See Balozet, Cordier & Ménager, 599.
Ménager, M. See Cordier & Ménager, 609.
Menck, F., 697.
Menkin, V., 441.
Menzani, C., 342.
Menzi, E. See Doerr & Menzi, 474.
Merchant, W. R. See Roderick, Harshfield & Merchant, 582.
Mesrobeanu, L. See Boivin & Mesrobeanu, 100.
Metalnikov, S., 558.
Meternowska, I. See Trawinski & Meternowska, 474.
Mettam, R. W. M., 713, 791.
Metsch, H., 750.
Meyer, A., 391.
Meyer, D. B., 119.
Meyer, K. F., 351, 616 *bis*.
—, & Eddie, B., 357, 736 *ter*.
Meyn, A. See Pallaske & Meyn, 93.
Mezwetaieff, M. W. See Yakimoff, Gousseff, Mezwetaieff & Rastegaïeff, 564.
Michalka, J., 47, 346.
Micheew, N. I. See Makkawejski, Karkadinowskaja & Micheew, 323.
Mickle, F. L. See Welch & Mickle, 326.
Middeldorf, R., 59.
Miegeville, M., 565.
Miessner, H., 398.
—, & Köser, A., 323.
—, & Schoop, G., 651, 666, 785.
—. See Uhlenhuth, Miessner & Geiger, 180.
Miethke, M., & Witt, G., 541.
Migone, L. E., & Pena, R., 517.
Miles, A. A., 373.
Milks, C. H. See Gilman & Milks, 332.
—. See Gilman, Milks & Birch, 704.
Miller, F. W. See Creech & Miller, 249.
Miller, J. F., 125.
Miller, J. J. See McCoy, Miller & Friedlander, 366.
Miller, M. M. See Frank, Clark, Haskell, Miller, Moss & Thomas, 55.
Miller, W. C., 691.
Miller, W. T., 547.
—. See Rosell & Miller, 303.
Millisher. See Chaillot & Millisher, 458.
Mills, E. A. See MacHattie, Mills & Chadwick, 362.
Minett, F. C., 457.
—, Stableforth, A. W., & Edwards, S. J., 197.
—, Wooldridge, G. H., & Sheather, A. L., 388.
Minkewitsch, J. E., 54.
Mirsabekjan, A. See Herrmann, Mirsabekjan & Megrabjan, 707.
Mitchell, D. T., 190.
Mitchell, W. C., & Cobbett, N. G., 109, 244.
Mitchell, W. M., 375.
Moe, L. H. See Sanborn, Stiles & Moe, 25.
Moghe, M. A., 746.
Mohler, J. R., 688.
Mohr, H. See Dieckmann & Mohr, 314.
Moldavskaja-Kritschewskaja, W. D. See Tzechnowitzer, Gorchowa & Moldavskaja-Kritschewskaja, 22.
Molina, R. R. See Bachman & Molina, 366.
Molinelli, E. A. See Sordelli & Molinelli, 331.
Möller, J. See Huck & Möller, 271.
Möllmann, L. H., 453.
Moltke, O., 166.
Monaco, R. See Cremona & Monaco, 387.
Monaldi, T. de S. See Ninni & Monaldi, 10.
—. See Troisier & Monaldi, 222.
Mönnig, H. O., 41, 248, 585, 674, 795.
—, & Marais, I. P., 674.
—, & Quin, J. I., 678.
Montgomerie, R. F., & Dalling, T., 333.
—, & Rowlands, W. T., 333.
Morariu, E. See Turcu & Morariu, 647.
Moreno, L. S., 707.
Morgan, D. O., 367.
—, & Clapham, P. A., 751.
Morgan, E., 715.
Morgan, K. G. See Gould & Morgan, 777.
Morizot, F. See Achard, Boutaric & Morizot, 45.
Morkeberg, A. W., 670.
Morley, L. C. See Wilson & Morley, 424.
Morris, K. R. S. See Saunders & Morris, 27 *bis*.
Morrison, L., & Leslie, A., 359.
Moss, F. J. See Frank, Clark, Haskell, Miller, Moss & Thomas, 55.
Moulin, A. See Basset & Moulin, 209.
Moulin, L. de S. See Lahaye & Moulin, 734.
Moulis, H., 568.
Moureau, M., & le Chuiton, F., 343.
Moussu, M. G., 560.
Muckenfuss, R. S. See McCordock & Muckenfuss, 358.
Muellerschoen, B. See Long & Muellerschoen, 18.
Müller, E., 392.

Müller, O., 391.
Munce, T. E., 417.
Münchberg, F., 483.
Munro, W. T. See Griffith & Munro, 7.
Munné, J. V., 309.
Muntwyler, E. See Myers, Muntwyler, Binns & Danielson, 292.
Murgatroyd, F. See Yorke, Murgatroyd & Hawking, 243.
Murnane, D., 206, 273.
Murphy, J. B. See Claude & Murphy, 671.
Murray, C. See Gehring & Murray, 613.
—. See McNutt, Walsh & Murray, 341.
—. See Patterson, Wilcke, Murray & Henderson, 439.
Murray, C. A. See Duerden, Murray & Botha, 183.
Murray, G. N., Schutte, D. J., & de Plessis, J. A., 588.
Murray, R. B. H., 715.
Myers, V. C., Muntwyler, E., Binns, D., & Danielson, W. H., 292.

N

Nagaty, H. F., 41.
Nagel, H. C., 729.
Nakamura, J., Oyama, S., Fukusho, K., & Tomonaga, N., 518.
Nakamura, N. See Kondo & Nakamura, 735.
Nash, T. A. M., 432, 659.
Nasta, M., 313.
Nastasi, A., 431.
Nattan-Larrier, L., & Grimard-Richard, L., 426, 723.
—, & Noyer, B., 26, 341 *ter*.
—, Nouguès, S., & Grimard-Richard, L., 723.
Nègre, L., 10, 497.
—, & Valtis, J., 701.
Neipp, L. See Régnier, & Neipp, 614.
Neitz, W. O., 570.
—, & Thomas, A. D., 517.
—. See Alexander & Neitz, 350.
—. See du Toit, Alexander & Neitz, 347 *bis*.
Nélis, P., & Bouckaert, J. J., 409.
—, & Picard, E., 409.
Nelson, E. C., 343.
Neseni, R., 285.
Nestl, S., 584.
Neufeld, F., & Etinger-Tulczynska, R., 146.
Neumark, E. See Happe & Neumark, 324.
Neveu, R., 384.
Neveu-Lemaire, M., 752.
Névot, 95.
Newman, C., 63.
Newsom, I. E., & Cross, F., 17, 733 *bis*.
—, & Stout, E. N., 745.
Nezwetaïeff, N. See Yakimoff, Gousseff & Nezwetaïeff, 22.
Nezwetaïeff, N. W. See Yakimoff, Nezwetaïeff & Petunina, 506.
Nicholson, A. J., 661.
Nicholson, J. A., 539.
Nicolau, S., 229.
—, & Kopciowska, L., 34, 730.
—, Mathis, C., & Constantinesco, V., 236.
Nicolle, C., 431.
—, & Anderson, C., 31.
—, & Balozet, L., 429.
Nieberle, K., 90.
—, & Pallaske, G., 501.
Nielsen, F., 280.
Nielsen, M., 252.
Niemczycki, S., 484.
Nieschulz, O., 164, 522.
—, & Bos, A., 736.
—, & du Toit, R., 741.
—. See Baudet & Nieschulz, 471.
Ninni, C., & Bretey, J., 151, 204.
—, & Monaldi, T. de S., 10.
—. See Boquet & Ninni, 476.
Noirot, P., 275.
Nono, A. M. See Russell & Nono, 60.
Nörr, J., 287.
Nouguès, S. See Nattan-Larrier, Nouguès & Grimard-Richard, 723.
Novácek, A., 532.
Novak, M. V., & Henrici, A. T., 220.
Nowakowski, B., 87.
Noyer, B. See Nattan-Larrier & Noyer, 26, 341 *ter*.
Nyiredy, I. See Csontos & Nyiredy, 732.

O

Oberling, C., & Guérin, M., 177.
Obitz, K., 247.
O'Callaghan, W. P., 330.
Oehme, 424.
Oehmke, 489 *bis*.
Okljesa, B., 781.
Okubo, K., 372.
Olcott, H. S., & Mattill, H. A., 587.
Olenev, N. O., & Rozhdestvenskaja, V. S., 618.
Olitsky, P. K., Cox, H. R., & Syverton, J. T., 616.
—. See Cox, Syverton & Olitsky, 353.
—. See Syverton, Cox & Olitsky, 352.
Olitzki, L., 255.
—, & Gurevitch, J., 420.
Oloffson, N. E., 177.
Olson, C., Jr. See Feldman & Olson, 606 *bis*, 624, 704.
Olson, H. C. See Thurston & Olson, 673.
Olver, A., 185.
Omlin, A., 24.
Oppermann, T., 398, 547.
—, & Doenecke, H., 454.
Opie, E. L., 114.
Orgel, D. See Erhardt & Orgel, 745.
O'Roke, E. C., 102.
Orr, A. B., 12.
Orr, J. H., & Reed, G. B., 422.
Orr, W., & Darling, F. F., 530.
Orre, B., 146.
Orskov, J. See Bang, Bendixen & Orskov, 648.
Ortlepp, R. J., 110.
Ossent, H. P., 208.
von Ostertag, R., 636 *bis*.
Ottaviani, G., & Cavalli, M., 287.
Otto, J. S., 131.
Oxer, D. T., 446.
Oyama, S. See Nakamura, Oyama, Fukusho & Tomonaga, 518.

P

Paarmann, E., 526, 663.
—. See Dobberstein & Paarmann, 767.
Pacheco, G., 702.
—, & Carneiro, V., 447.
Pachomoff, V. J. See Bachrach & Pachomoff, 409.
Packchanian, A., 759.
Paisseau, G. See Valtis, Paisseau & van Deinse, 476.
Pallaske, G., 209, 698.
—, & Meyn, A., 93.
—. See Nieberle & Pallaske, 501.
Palmer, C. C., 282.
Palmer, E. W. See Duerden & Palmer, 183.
Palmer, V. E. See Biely, Palmer & Lerner, 262.
Panisset, M. L., & Masson, G., 57.
Papadaniel, S., 364.
Papi, A., 393.
Pappenheimer, A. M., Goettsch, M., & Alexieff, A., 534.
Parhon, C. I., Coban, S., & Fastlich, G., 282.
Park, S. E. See Wallace & Park, 215.
—. See Slatter, Park & Graham, 674.
Parkes, A. S., 376, 631.
—. See Hill & Parkes, 632.
Parkhurst, R. T., & McMurray, M. R., 382.
Parrot, L., Donatien, A., & Lestoquard, F., 576.
—. See Sergent, Donatien, Parrot & Lestoquard, 506, 566.
Pascal, 305.
Patino, F. P. See Guerrero & Patino, 506.
Patterson, F. D., 338, 425, 564.
—, Wilcke, H. L., Murray, C., & Henderson, E. W., 439.
Patton, W. S., 37, 243.
—. See Cushing & Patton, 576.
Paulson, M., & Brown, J. H., 154.
Pavlof, 786.
Pawlowski, E., 154.
Pawlowsky, E. N., & Stein, A. K., 662.
Pécard, 60.
Pedersen, H. O., 563.
Pedersen-Bjergaard, K., 761.
—. See Glud, Pedersen-Bjergaard & Portman, 182.
Peele, H., 193.
Peitzer, G., 391.
Pelczar, K., & Hofbauer, J., 174.
Pena, R. See Migone & Pena, 517.
Penn, J. See Hollande & Penn, 526.
Pepeu, F., 15.
Pérard, C., 508.
Perdrau, J. R., & Todd, C., 237.
Peres, M., 420.
Perin, M., 565.
Perrot. See Tachon, Perrot & Verge, 125.
Peskett, G. L., 630.
Peter, 739.
Petersen, G., 598.
Peterson, W. E. See Wayne, Eckles & Peterson, 133.
Petragnani, G., 699.
Petunina, P. I. See Yakimoff, Nezwetaïeff & Petunina, 506.
Pfeiffer, W., 495.
Phaloukis, J. See Caminopetros, Phaloukis & Contos, 470.
Phease, R. N., 332.
Philip, C. B., & Jellison, W. L., 618.
—. See Jellison & Philip, 358.
Phillips, P. H., & Stare, F. J., 587.
Phillips, R. W. See McKenzie & Phillips, 631.
Philp, T., 265.
Picard, E. See Nélis & Picard, 409.
Picard, W. K., 107.
Pickens, E. M. See Everson, Poelma, Brueckner & Pickens, 502.
—. See Poelma, Everson, Brueckner & Pickens, 579.
Pickford, M. See Klisiecki, Pickford, Rothschild & Verney, 63.
Picton, L. J., 537.
Piening, C., 99.
—. See Dobberstein & Piening, 649, 767.

Pieraerts, G. See Konné & Pieraerts, 609.
Piercy, S. E., 535.
Piéri, J., & Lena, D., 570.
—. See Joyeux & Piéri, 430.
Piettre, M., 383.
Pigneur, G., 25.
Pigoury, L. See Guillot & Pigoury, 207.
Pillers, A. W. N., 298, 531, 743, 747.
Pilot, I., & Davis, D. J., 407.
Pineteau, M., Pineteau, M., Jr., & Pineteau, R., 778.
Pineteau, M., Jr. See Pineteau, Pineteau & Pineteau, 778.
Pineteau, R. See Pineteau, Pineteau & Pineteau, 778.
Pirani, A., 479.
Pirot, R. See Marcandier & Pirot, 431.
Pinkepank, H. See Pröscholdt & Pinkepank, 369.
Pinoy, P. E., & Fabiani, G., 639.
Pinto, C., 404.
Pittermann, J., & Schouppé, K., 67.
Placidi, L. See Verge & Placidi, 639.
van der Plank, G. M., 138.
Plastridge, W. N., & Anderson, E. O., 406.
—, & Rettger, L. F., 601.
—. See Jungherr & Plastridge, 155.
—. See Rettger, Plastridge & Cameron, 415.
—. See White, Johnson, Plastridge & Reece, 325.
Plazy, & Germain, 431.
du Plessis, J. See Murray, Schutte & du Plessis, 588.
Plotz, H., 238 *ter*, 574, 735 *bis*.
—, & Ephrussi, B., 238.
Plum, N., 86, 91, 370, 393, 646, 766.
—. See Emsbo & Plum, 695.
Plummer, H., 694, 757.
Poelma, L. J., Everson, C. L., Brueckner, A. L., & Pickens, E. M., 579.
—. See Everson, Poelma, Brueckner & Pickens, 502.
Poenaru, H. See Condrea & Poenaru, 258 *bis*.
Poindexter, H. A., 719.
Poisson, H., 744.
Pokschischewsky, N. A., & Golowin, A. D., 147.
Ponto, S. A. S. See Krijgsman & Ponto, 108.
Popovici, I. See Cernaianu & Popovici, 210.
Popow, N. A., Kudriavcew, A. A., & Krasovsky, W. K., 278.
Popper, M., Teitel-Bernard, A., & Dinischiotu, G. T., 115 *bis*.
Porter, D. A. See Ackert, Porter & Beach, 40.
Portman, K. See Glud, Pedersen-Bjergaard & Portman, 182.
Pospesch, L. See Kotlán & Pospesch, 21.
Pospiech, 339.
van der Post, A. P., 589.
Potter, M. See Hassal & Potter, 167.
Poty, P. L., 68.
Pou, M. C., 532.
Poulton, W. F., 790.
Poutchkova, A. I. See Tarjew & Poutchkova, 716.
Powley, J. O., 515.
Prado, A., 741.
Presch, L. See Karmann & Presch, 337.
Previtera, A., 722.
Pribyl, E., 284, 290, 783.
Price, R. M., 7, 89.
Prieur, M. See Launoy & Prieur, 225.
Pro, G., 109.
Prodanoff, P., 667.
Prod'homme, C., 485.
Prokopowicz-Wierzbowska, M. See Fejgin & Prokopowicz-Wierzbowska, 153.
Pröscholdt, Rautmann, Scharr & Schumann, 371.
Pröscholdt, O., 157.
—, & Pinkepank, H., 369.
Pugh, L. P., 388.
Pullinger, E. J., 582.
Puri, I. M., 361 *bis*.

Q

Quabeck, H., 56.
Quentin, 353.
Quin, A. H., Jr., & Shoeman, J. W., 379.
Quin, J. I., 677 *bis*.
—. See Mönnig & Quin, 678.
—. See Rimington & Quin, 677.
Quinlan, J., 132.
—, Maré, G. S., & Roux, L. L., 132, 631.

R

Rabagliati, D. S. See Young & Rabagliati, 178.
Raffell, S., 621.
Rafinski, K. See Legezynski & Rafinski, 706.
Rainsford, S. G., 419.
Raistrick, H., & Topley, W. W. C., 762.
Rakieten, T. L. See d'Herelle & Rakieten, 738.
Rajagopalan, V. R. See Datta & Rajagopalan, 615.
Rajcevic, M., & Butozan, V., 444.
Ramazzotti, G., 355.
Ramon, G., & Djourichitch, M., 442.
—, & Lemétayer, E., 114, 372.
Randall, R., 718.
Rao, M. A. N., 249.
—, & Ayyar, L. S. P., 38.
Rastegaïeff, E. F., 608.
—. See Yakimoff, Gousseff & Rastegaïeff, 337.
—. See Yakimoff, Gousseff, Mezwetaieff & Rastegaïeff, 564.
—. See Yakimoff, Matikaschwili, Rastegaïeff & Lewkowitsch, 337.
Ratcliffe, H. L., 614.
Rautmann, 533.
—. See Pröscholdt, Rautmann, Scharr & Schumann, 371.
Rautmann, H., 90, 149, 313.
—, & Hartwigk, H., 697.
Ravaut, P. See Levaditi, Ravaut & Levaditi, 166.
—. See Levaditi, Ravaut, Vaisman & Schoen, 166.
Rawling, S. O., 496.
Rea, H. C., 381.
Reakes, C. J., 294, 449.
Records, E., & Vawter, L. R., 616, 654.
—, Vawter, L. R., Baker, F. H., & Woodward, G. T., 616.
—. See Vawter & Records, 351.
Reece, R. P. See White, Johnson, Plastridge & Reece, 325.
Reed, G. B. See Orr & Reed, 422.
—. See Rice & Reed, 204.
Rees, C. W., 101, 566.
Regendanz, P., 566.
—, & Reichenow, E., 423.
Regnér, G., 311, 598.
Régnier, J., & Lambin, S., 785.
—, & Neipp, L., 614.
Reichel, J., 623.
—, & Schneider, J. E., 17.
Reichenchammer, C. A., 210.
Reichenow, E., 26, 720.
—. See Regendanz & Reichenow, 423.
Reid, H. A., 47.
Reifenstein, E. C., Allen, E. G., & Allen, G. S., 42.
Reimann, 331.
Reiner, L. See Smythe & Reiner, 775.
Reinhardt, R., 390, 714.
Reinstoff, A., 129.
Reisinger, L., 433.
Reitano, U., & Boncinelli, U., 431.
Rek, L., 272.
Remien, A., 739.
Remlinger, P., 349.
—, & Bailly, J., 165 *bis*, 234 *quat*, 235 *sex*, 468 *bis*, 480, 572 *bis*, 731 *bis*, 782 *bis*.
—, Rossi, P., & Bailly, J., 468.
Renaux, E., 240.
—. See Bordet & Renaux, 44.
Rennes, 180.
Rennes, J., 595.
Reppin, K., 541.
Retterer, E., & Alexandresco, G., 781.
Rettger, L. F., 317.
—, & Gillespie, H. B., 335.
—, Plastridge, W. N., & Cameron, 415.
—. See Plastridge & Rettger, 601.
Reyes, R. V., 750.
Reynal, J. See Balozet & Reynal, 460.
Reynes, V. See Aubertin & Reynes, 10.
Rice, C. E., & Reed, G. B., 204.
Rice, R. M. See Beattie & Rice, 708.
Rich, A. R., 443.
Richardson, H. B. See Loebel, Shorr, Richardson & Harris, 412 *bis*.
Richardson, R. D. See Mellon, Richardson & Fisher, 201.
Richters, 389 *ter*.
Rieck, W., 397.
Riedel. See Kammel & Riedel, 55.
Riedel, W., 271.
Riedmüller, L., 418, 427, 650.
Riegel, C. See Wolff, Riegel & Try, 276.
van Riemsdijk, M., 700.
Riffert, W., 445.
Rigg, T., & Askew, H. O., 581, 772.
—, —, & Kidson, E. B., 627.
—. See Askew & Rigg, 581.
Rimington, C., & Steyn, D. G., 584.
—, & Quin, J. I., 677.
Ringseisen, J., 128.
Rinjard, P., 460.
Rivers, T. M., & Schwentker, F. F., 729.
—, & Ward, S. M., 350.
—. See Schwentker, Rivers & Finkelstein, 350.
Rivoire, R., 403.
Roach, W. See Biely & Roach, 95.
Robert, R., 59.
Roberts, F. H. S., 246.
Roberts, J. I., & Tonking, H. D., 355.
Roberts, R. A., 619.
Roberts, R. S., 213.
—. See McEwen & Roberts, 755.
Robertson, D. See Fraser & Robertson, 751.
Robinson, A. D. See Brown, Savage & Robinson, 118.
Robinson, E. M., & Coles, J. D. W. A., 102.
Robinson, W. G., 587.
Robson, J. M., & Taylor, H., 182,

Rochaix, A., & Couture, E., 601.
—, Tapernoux, A., & Couture, E., 601.
Rockwell, G. E., 309.
Roderick, L. M., Harshfield, G. S., & Merchant, W. R., 582.
Rodieux, M. See Crochet & Rodieux, 16.
Rodolfo, A., 780.
Rodriguez-Molina, R. See Bachman & Rodriguez-Molina, 42.
Roets, G. C. S. See du Toit, Malan, Louw, Halzapfel & Roets, 289.
Rohdenburg, G. L. See Krug & Rohdenburg, 64.
Roholm, K., 779.
Rohonyi, M., 501.
O'Roke, E. C., 715.
Rolle, M., 418, 711.
Roman, G. See Taylor, Vidal & Roman, 649.
Romanowa, K. See Roskin & Romanowa, 443.
Romanski, S., 657.
Romezo, L. P., 132.
van Rooyen, C. E. See Mackie, van Rooyen & Finkelstein, 763.
—. See Mackie, van Rooyen & Gilroy, 212.
Rose, A. L., 446.
Rosell, J. M., 306, 405 *bis*.
—, & Miller, W. T., 303.
Rosenow, E. C., 407 *bis*.
Roskin, G., & Romanowa, K., 443.
Ross, H. E. See Glenny, Barr, Llewellyn-Jones, Dalling & Ross, 422.
Ross, I. C., 38.
—, & Gordon, H. M., 524.
—, & Graham, N. P., 274, 540.
Rossi, P., 431, 606, 703.
—, & Saunié, L., 527 *bis*.
—, & Vigel, F., 527 *bis*.
—. See Remlinger, Rossi & Bailly, 408.
Roth, H. See Condrea & Roth, 395.
Rothschild, P. See Klisiecki, Pickford, Rothschild & Verney, 63.
Rous, P., & Beard, J. W., 784.
Roussel, G. See Brocq-Rousseau & Roussel, 131.
Roux, G., 344.
Roux, L. L. See Quinlan, Maré & Roux, 132, 631.
le Roux, P. L. See MacDonald & le Roux, 62.
Row, R., Dalal, N. P., & Gollerkeri, G. V., 180.
Rowlands, W. T. See Montgomerie & Rowlands, 333.
Roy, A. C. See Sen & Roy, 512.
—. See Haddow, Sen & Roy, 571.
Roy, D. N. See Strickland & Roy, 180.
Rozhdestvenskaja, V. S. See Olenev & Rozhdestvenskaja, 618.
Rudolf, 605.
Ruiz, C., & Arroyo, C., 410.
—. See Vidal, Ruiz, Arroyo & Enríquez, 442 *bis*.
Ruiz Martínez, C., 423, 439.
Runge, S., 281.
—, & Witkowski, B., 530.
Russell, P. F., 60, 339.
—, & Nono, A. M., 60.
Rutgers, J. I. See Girard, Sandulesco, Fridenson & Rutgers, 67.

S

Saar, F., 126.
van Saceghem, R., 428 *bis*, 466, 615.
Saenz, A., 497.
—, & Costil, L., 93, 204.
—. See Boquet & Saenz, 148, 309.
—. See Calmette, Weil-Hallé, Saenz & Costil, 701.
Sainton, P., & Largeau, R., 781.
Saint-Prix, L. A., 26.
Saisawa, K., Taise, K., & Kaneko, K., 340.
Salomon, S., 767.
Salsbery, C. E., 663.
Sampson, J., Gonzaga, A. C., & Hayden, C. E., 284.
Sanarelli, G., & Alessandrini, A., 314, 639.
Sanborn, C. E., Stiles, G. W., & Moe, L. H., 25.
Sanchez, L., 429.
Sandulesco, G. See Girard, Sandulesco, Fridenson & Rutgers, 67.
de Santis, Maria, 503.
Santoni, L., 129.
Sarles, M. P., 750.
Sarnowiec, W., 104, 317, 346, 428 *bis*, 527, 607, 738 *ter*.
Sasaki, S., 710.
Sassuchin, D., 462.
Sauerzapfe, E. See Wohlfeil, Sauerzapfe & Lapidas, 136.
Saunders, G. F. T., & Morris, K. R. S., 27 *bis*.
Saunié, L. See Chaillot & Saunié, 175.
—. See Rossi & Saunié, 527 *bis*.
Sausseau, E. See Donatien, Lestoquard, Sausseau & Maubaret, 713.
Savage, A. See Brown, Savage & Robinson, 118.
Savage, W. G. 268, 415.
Savance, P. See Lestoquard & Savance, 162.
de Savitsch, E. See Sewall, de Savitsch & Butler, 313.
Saxer, E., 209.
—. See Erisman & Saxer, 623.
Saxinger, G., 490.
Scaduto, P., 754.
Schacht, G., 391.
Schaeffer, A. B., & Fulton, M., 185.
Schafer, E. See Vignoli & Schafer, 460.
Schaffer, J. M. See Wright, Bozicevich, Underwood & Schaffer, 275.
Schamburow, D. A., 45.
Scharr, 419, 489.
—. See Pröscholdt, Rautmann, Scharr & Schumann, 371.
Scharr, E., 137.
Schatalow, P., 66.
Schätzl, J., 70.
Schebitz, 263.
van der Scheer, J. See Landsteiner & van der Scheer, 764.
Schepel, J. A. C., 731.
Schick, 131.
Schiel, O., 498.
Schilling, C., 218.
Schittenhelm, A., 15.
Schlegel, M., 364.
Schlotthauer, C. F., Essex, H. E., & Mann, F. C., 342.
—. See Bollman & Schlotthauer, 547.
Schmaltz, 787.
Schmedt, O., 13.
Schmid, F., 743, 750.
Schmid, G., 207.
Schmidt, C. F., & Livingston, A. E., 276 *ter*.
Schmidt, E., 70.
Schmidt, J., 424.
Schmidt, W., 54, 321, 702.
—. See Schmidt-Hoensdorf & Schmidt, 4.
Schmidt-Hoensdorf, F., & Schmidt, W., 4.
Schmitt, J., 585.
—. See Luy & Schmitt, 68.
—. See Trautmann & Schmitt, 133.
Schneider, 181.
Schneider, J. E. See Reichel & Schneider, 17.
Schneider, K. T. See Zorn, Krallinger, Schneider & Schott, 187.
Schoen, R. See Levaditi & Schoen, 229.
—. See Levaditi, Ravaut, Vaisman & Schoen, 166.
Schofield, F. W., 651, 667.
Schönberg, F., 672, 771.
Schönfeld, W., 658.
Schoon, J. G., 39.
Schoop, G. See Berge & Schoop, 710.
—. See Miessner & Schoop, 651, 666, 785.
Schott, A. See Zorn, Krallinger, Schneider & Schott, 187.
Schott, R. G., 12.
—. See Gowen & Schott, 476, 625.
Schouppé, K. See Pittermann & Schouppé, 67.
Schrire, I., & Zwarenstein, H., 632.
Schroeder, H. O., Jr., 242.
Schuler, & Velu, H., 354.
Schulhof, A., 671.
Schulz, R. E. See Skriabine & Schulz, 744.
Schumann. See Pröscholdt, Rautmann, Scharr & Schumann, 371.
Schunke, P. See Francke, Standfuss & Schunke, 611.
Schurnakowa, M. A., 97.
Schutte, D. J. See Murray, Schutte & du Plessis, 588.
Schwarte, L. H., 717.
Schwartz, B., Imes, M., & Wright, W. H., 367.
Schwentker, F. F., Rivers, T. M., & Finkelstein, M. H., 350.
—. See Rivers & Schwentker, 729.
Schwerdt, I., 433.
Schwetz, J., 22, 37, 222, 612, 720.
—, Els, & Caccavella, 725.
Scott, B. V. D. See Hall & Scott, 710.
Scott, J. P., & Brandly, C. A., 395.
Seagar, E. A., 533 *bis*.
Seastone, C. V., & Lawrence, M. B., 19.
Sebrell, W. H., Dean, H. T., Elvove, E., & Breaux, R. P., 181.
Sédallian, P., & Clavel, J., 764 *bis*.
Seddon, H. R., 505, 545.
—, & Chamberlin, W. E., 545.
—. See Tillyard & Seddon, 109.
Sedlmeier, H., 573.
Seehawer, 711.
Seehawr, 578.
Seekles, L. See Sjollema & Seekles, 279, 280.
Seelemann, M., 128, 306 *ter*, 307 *ter*.
—, & Hadenfeldt, A., 407, 497, 597.
—, & Siemonsen, K., 585.
Segre, S. See Gerlach, Segre & Brosch, 206.
Seidenberg, S., 519.
Seifert, G., 394.
Seifried, O., 136.
—, & Heibstreith, H., 729.
Sen, K. C., & Roy, A. C., 512.
—. See Haddow, Sen & Roy, 571.
Sen, S. K., 401, 486, 507, 551, 740.
Sendrail, J., 46.

Seren, E., 19.
Sergent, E., 137.
—, & Catanei, A., 162.
Sergent, Ed., Donatien, A., Parrot, L., & Lestoquard, F., 506, 566.
Sewall, H., de Savitsch, E., & Butler, C., 313.
Sforza, M., 380.
Shahan, M. S. See Giltner & Shahan, 351, 427 *bis*.
Shanks, P. L. See Lamont, Kerr & Shanks, 560.
Sharpe, G. C. H., 686.
Shearer, G. D., & Stewart, J., 748.
Sheather, A. L., 156, 599.
—. See Minett, Wooldridge & Sheather, 388.
Sherman, J. M., & Wing, H. U., 179.
—. See Wahby & Sherman, 304.
Shillinger, J. E. See Green, Katter, Shillinger & Hanson, 349.
Shimidzu, T., 44.
Shimomura, K. See Fukushima & Shimomura, 518.
Shoeman, J. W. See Quin & Shoeman, 379.
Shope, R. E., 234, 573.
Shorr, E. See Loebel, Shorr, Richardson & Harris, 412 *bis*.
Short, P. G., 789 *bis*.
Shortt, H. E., & Brooks, A. G., 656.
—, & Lahiri, B. N., 656.
—, Malone, R. H. Craighead, A. C., & McGuire, J. P., 656.
Shwartzman, G., 173.
Sickmüller, E. See Gminder & Sickmüller, 150.
Sicilia, G. See Guiseppe & Sicilia, 386.
Siemonsen, K. See Seelemann & Siemonsen, 585.
Sierakowski, S., & Leczycka, E., 462.
Signori, A., 446.
Simms, B. T., 38.
Simonatti, E., 6.
Simpson, M. E. See Evans, Gustus & Simpson, 548.
—. See Evans, Simpson & Austin, 632.
Simpson, R., 192.
Sinclair, J. M., 555.
Sinclair, W. M., 521.
Singer, E., & Fischl, V., 774.
—. See Fischl, Kotrba & Singer, 774.
Singh, B. See D'Costa & Singh, 429, 615.
Sinitsin, D. F., 110.
Sjöberg, A., 671.
Sjöberg-Klaavu, A., 663.
Sjöfält, N., 461.
Sjollema, B., & Seekles, L., 279, 280.
Skar, O., 53.
Skarzynski, B., 281.
Skriabine, K. I., & Schulz, R. E., 744.
Slagsvold, L., 206, 273, 319, 379, 504, 779.
Slatter, E. E., Park, S. E., & Graham, R., 674.
Slawinski, A., 291.
Smith, A. D. Buchanan, 438.
Smith, A. H. See Brooke, Smith & Smith, 629.
Smith, H. F. See Cotton, Buck & Smith, 156 *bis*, 329.
Smith, H. R., 92.
Smith, J., 191, 320, 441.
Smith, P. K. See Brooke, Smith & Smith, 629.
Smith, R. M. See Bleecker & Smith, 773.
Smith, T., 158.
Smith, W., Andrewes, C. H., & Laidlaw, P. P., 357.
Smithburn, K. C., 203, 699.
Smock, S. C., 539.
Smyth, C. V., & Reiner, L., 775.
Sobra, K., 654.
Soetisno, M., 163, 767.
Solomon, S. G., 113, 247.
Sommer, E. W. See Sommer & Sommer, 99.
Sommer, H., & Sommer, E. W., 99.
Sordelli, A., & Molinelli, E. A., 331.
Souchard, L. See Vittoz & Souchard, 149.
Spahlinger, H., 154.
Spann, J., 433.
Spartz, L., 696, 697.
Spence, J. H., 727.
Spicer, A., 255.
Spindler, L. A., 754.
Spinelli, A., & Favia, N., 606.
Spray, R. S., 395.
Ssolonitzin, J. A., 112.
Stableforth, A. W., 388.
—. See Minett, Stableforth & Edwards, 197.
Stafseth, H. J., & Thompson, W. W., 60.
Stalfors, H., 387.
—, & Hoflund, S., 282.
Stampa, W., 46.
Standfuss, R. See Francke, Standfuss & Schunke, 611.
Stare, F. J. See Phillips & Stare, 587.
Starr, L. E., 416.
Stearn, A. E., 396.
Steck, W., 772.
—, Bachmann, W., Kaestli, P., & Gygax, E., 306.
Steffens, M., 543.
Stein, A. K. See Pawlowsky & Stein, 662.
Stenius, R., 171.
Sterne, M. See Alper & Sterne, 488.
Stevens, W. S., 150.
Stevenson, W. D. H., & Butler, G. G., 239.
Steward, J. S., 472 *bis*.
Stewart, J., 748.
—, & Wright, C. W. B., 539.
—. See Shearer & Stewart, 748.
Stewart, J. L., 74, 75, 792.
Stewart, W. L., & Westwater, C. H., 647.
Steyn, D. G., 61, 131, 584, 595.
—. See Rimington & Steyn, 584.
Steyrer, A., 649.
Stiles, G. W. See Sanborn, Stiles & Moe, 25.
Stimson, A. M., & Hedley, O. F., 178.
Stinnett, M. S. See Lawson & Stinnett, 701.
Stirling, J. D., & Blackwood, J. H., 268.
Stirling, R. F., 466.
Stockmayer, W., 324, 419 *bis*, 606.
—. See Beller & Stockmayer, 97, 324.
—. See Zeller & Stockmayer, 327.
Stoll, N. R., 41.
Stoss, A. O., 175.
Stout, E. N. See Newsom & Stout, 745.
Strickland, C., & Roy, D. N., 180.
Struck, M. See Küst & Struck, 678.
Stuart, H. O. See Delaplane & Stuart, 342.
—. See Delaplane, Stuart & Bunyea, 262.
Stubbs, E. L., 575.
Stubbs, J. R. See Elsdon & Stubbs, 583.
Stuhlenmiller, M., 377.
Stumberg, J. E., 41, 365.
Stylianopoulos, M., 379.
—, & Ananiadès, B., 221, 506.
Subbarayudu, M. V. See Ajwani & Subbarayudu, 609.
Summers, G. J. See Griffith & Summers, 201.
Sutton, C. See Verder & Sutton, 415.
Svanberg, O., 51, 263 *bis*.
Svanberg, V., 643 *bis*.
Svendsen, A., 696.
Swales, W. E., 361, 435.
Swearingen, J. S., & Lewis, I. M., 336.
Swift, H. F. See Hodge & Swift, 368.
Swingle, E. L., & Koser, S. A., 396.
Swynnerton, C. F. M., 359.
—. See Chorley & Swynnerton, 490.
Sykes, P. H., 630.
Sykora, F., 216.
Syverton, J. T., Cox, H. R., & Olitsky, P. K., 352.
—. See Cox, Syverton & Olitsky, 353.
—. See Olitsky, Cox & Syverton, 616.
Szentkirályi, Z. See Lörincz & Szentkirályi, 576.
Szepeshelyi, A., 768.
Szidat, L., 745.
Szidat, U. See Laothr & Szidat, 472.
Szongott, H. See Tomcsik & Szongott, 87.

T

Taagepera, K., 137.
Tachon, Perrot, & Verge, J., 125.
Taise, K. See Saisawa, Taise & Keneko, 340.
Talbot, R. J. de C., 176.
Taliaferro, L. G. See Taliaferro & Taliaferro, 759.
Taliaferro, W. H., & Taliaferro, L. G., 759.
Tani, S., 649.
Taniguchi, T., Hosokawa, M., Kuga, S., & Fujino, T., 682.
Tapernoux, A., 537.
—. See Rochaix, Tapernoux & Couture, 601.
Tarassow, W., 747.
Tarejew, E. M., & Poutchkova, A. I., 716.
Tate, P., & Vincent, M., 180.
Taylor, E. L., 113, 127, 523, 742, 752.
Taylor, G. L., Adair, G. S., & Adair, M. E., 760.
Taylor, H., 769.
—. See Robson & Taylor, 182.
Taylor, R. M., 563.
—, & Hazemann, R. H., 159.
—, Vidal, L. F., & Roman, G., 649.
Taylor, T. J. See Hinshaw & Taylor, 317.
Taylor, W., 718.
Tchernomoretz, I., 340.
Teichmann, R., & Mempel, S., 417.
Teitel-Bernard, A. See Popper, Teitel-Bernard & Dinischiotu, 115 *bis*.
Theiler, A., 382 *ter*, 517.
Thiery, J., 34 *bis*.
Thomas, A. D., & Brown, M. H. V., 262.
—. See Neitz & Thomas, 517.
Thomas, E. F., 773.

Thomas, R. C. See Frank, Clark, Haskell, Miller, Moss & Thomas, 55.
Thomas, R. G., 546.
Thomas, R. M., 699.
Thompson, L., 220.
—. See Beaver & Thompson, 652.
Thompson, R., 270.
Thompson, W. W. See Stafseth & Thompson, 60.
Thomsen, A., 35, 459, 605.
Thomson, D. L. See Collip, Anderson & Thomson, 393.
Thomson, J. G., 338.
—, & Hall, G. N., 608.
Thomson, W. See Fraser, Godden & Thomson, 264.
Thorp, F., Jr., & Graham, R., 155, 324.
Threlkeld, W. L., 751.
Thurston, L. M., & Olson, H. C., 673.
Tiedge, F. L., 458.
Tillyard, R. J., & Seddon, H. R., 109.
Todd, C. See Elford & Todd, 519
—. See Perdrau & Todd, 237.
Todd, E. W., 173.
du Toit, P. J., 589.
—, Alexander, R. A., & Neitz, W. O., 347 *bis*.
—, Malan, A. I., & Groenewald, J. W., 68.
—, —, Louw, J. G., Holzapfel, C. R., & Roets, G. C. S., 289.
du Toit, R. See Nieschulz & du Toit, 741.
Toma, A. See Balteanu, Toma & Garaguli, 313.
Tomasec, I., 561.
Tomonaga, N. See Nakamura, Oyama, Fukusho & Tomonaga, 518.
Tomczik, J., & Szongott, H., 87.
Tongio, S., 377.
Tonking, H. D. See Roberts & Tonking, 355.
Topacio, T., 464, 571, 697.
Topley, W. W. C., 451, 529, 668.
—. See Raistrick & Topley, 762.
Torrance, H. L., 266.
Traub, E., 572.
Trautmann, A., 278.
—, & Schmitt, J., 133.
Trawinski, A., & Meternowska, I., 474.
Trensz, F., & Jardon, M., 225.
Troisier, J., & Monaldi, T. de S., 222.
Trouette, 781.
Trout, G. M., 54.
Truche, A., & Bauche, J., 318.
Trudell, F. See Hucker, Trudell & Jennings, 5.
Tschernjak, W. S., 334.
Tschistowitsch, A. N., 48.
Tsuchimoto, S., 680.
Tubangui, M., 363.
Tucker, H. H., 268.
Tunnicliff, E. A., 422.
Turbet, C. R., 7, 76, 77, 294, 479.
Turcu, T., & Morariu, E., 647.
Turnbull, D. O., 450.
Turner, E. L., Berberian, D. A., & Dennis, E. W., 363.
Turner, H. W., 47.
Tutt, J. F., 156, 274.
Tutt, J. F. D., 776.
Tweed, W., 383.
Twinn, C. R., 715.
Tyzzer, E. E., 717.
Tsechnowitzer, M. M., Gorchowa, E. L., & Moldavskaja-Kritschewskaja, W. D., 22.
Tzortzaki, N. See Mélanidi, Tzortzaki & Débonera, 230.

U

Udall, D. H., 557.
Uhlenhuth, P., Miessner, H., & Geiger, W., 180.
Ulm, E., 46.
Underhill, S. W. F. See Crew, Culhane & Underhill, 587.
Underwood, P. C., & Wright, W. H., 127.
—. See Wright, Bozicevich, Underwood & Schaffer, 275.
Unwin, H. R., 212.
Urbanczyk, W. See Marchlewski & Urbanczyk, 135.

V

Vaisman, A. See Levaditi, Ravaut Vaisman & Schoen, 166.
Valcarenghi, E., 350, 699.
Valcarenghi, M. E., 370.
Valla, G., 419.
Valtis, J., 452.
—, & van Deinse, F., 456.
—, Paisseau, G., & van Deinse, F., 476.
—. See Boquet & Valtis, 369.
—. See Lépine & Valtis, 9.
—. See Nègre & Valtis, 701.
Vandestrate, M., 89.
Vara, G. G. See Hernández & Vara, 415.
Varenne, H., & Marchand, E., 514.
Varley, G. C., & Butler, C. G., 37.
Vattuone, A. B., 250.
Vawter, L. R., 334.
—, & Records, E., 351.
—. See Records & Vawter, 616, 654.
—. See Records, Vawter, Baker & Woodward, 616.
Vedel, R. See Blanchard & Vedel, 353.
Veenendaal, H., 184.
Veloppé, 58.
Velu, 354.
Velu, H., 130, 193 *bis*, 565, 781.
—, & Zottner, G., 104, 481, 542, 561 *bis*, 644.
—, —, & Ipoustéguy, P., 24, 542.
—. See Schuler & Velu, 354.
Veluet, H., 787.
Venske, W., 708.
Verder, E., & Sutton, C., 415.
Verge, J., 207, 644, 709.
—, & Placidi, L., 639.
—. See Tachon, Perrot & Verge, 125.
Verney, E. B. See Klisiecki, Pickford, Rothschild & Verney, 63.
Vidal, J., Ruiz, C., Arroyo, C., & Enríquez, C. S., 442 *bis*.
Vidal, L. F. See Lisbonne & Vidal, 460.
—. See Magallon & Vidal, 98.
—. See Taylor, Vidal & Roman, 649.
Vigel, F. See Rossi & Vigel, 527 *bis*.
Vignoli, L., & Schafer, E., 460.
Viljoen, P. R., 589.
Villain, G., & Comte, G., 396.
Vincent, M. See Tate & Vincent, 180.
Vink, H. H., 379.
Viriden, P., 325, 564.
Vittoz, R., & Souchard, L., 149.
Vitu. See Marotel & Vitu, 363.
van Vloten, J. G. C., 118.
Vogel, B., 724.
Vogt. See Küst & Vogt, 783.
Vogt-Moller, P. See Bay & Vogt-Moller, 675.
Voigtländer, W., 664.
Völker, R., & Weingart, H., 542.
Voet, J. See Klarenbeek & Voet, 30.
Voracek, F., 696.
Voronoff, S., 781.
Voss, B., 681.
de Vries, A. H., 619.
de Vries, L. P., 498.

W

Wade, E., 212.
Wagener, K., 623, 709.
Wagner, H., 680.
Wagner, O., 749.
Wahby, A. M., & Sherman, J. M., 304.
Wajda, J., 622.
Wakamatsu, Y., 785.
Waldmann, O., 541, 573.
Walker, A. T., 42.
Walker, J., 143, 465.
Walkiewicz, W., 33, 346.
Wall, R. E., 144.
Wall, S., 562.
Wallace, G. I., & Park, S. E., 215.
Wallace, J. M., 509.
Waller, E. F., 717.
Walsh, F. E. See McNutt & Walsh, 604.
—. See McNutt, Walsh & Murray, 341.
Wangliang, 89.
Ward, A. See Harris, Clay, Hargreaves & Ward, 289.
Ward, S. M. See Rivers & Ward, 350.
Wardle, R. A., 110.
—. See Allen & Wardle, 662.
Ware, F., 399, 491, 550.
Warren, D. M. See Butler & Warren, 417.
Waters, W., 755.
Watson, E. A., 312.
Watson, R. H., 545 *bis*.
Wayne, R., & Macy, H., 133.
—, Eckles, C. H., & Peterson, W. E., 133.
Weatherall, C. See Cummings & Weatherall, 497.
Weber, A. L. See Beaudette, Hudson & Weber, 626.
Wedemann, W. See Helm & Wedemann, 541.
Wedum, A. G., 256.
Weed, L. A., & Ecker, E. E., 57, 445.
Wehr, E. E., 360.
—. See Cram & Wehr, 753.
Wehrle, E., 478.
Weidlich, N., 410, 498.
Weil-Hallé, B. See Calmette, Weil-Hallé, Saenz & Costil, 701.
Weingart, H. See Völker & Weingart, 542.
Weinzirl, J. See Dingle & Weinzirl, 204.
Weiss, E., 185.
Weiss, R., 786.
Weissmann, L. See Baumann & Weissmann, 734.
Welch, H., & Mickle, F. L., 326.
Weld, J. T., 597.
Wells, W. F. See Feemster & Wells, 358.
Wendel, W. B., 272.
Werdelin, C., 92.
Wesche, G., 766.
Wester, J., 767.
Westwater, C. H. See Stewart & Westwater, 647.
Wetzel, 746.
Wetzel, R., 168, 250, 362.
White, G. C., Johnson, R. E., Plastridge, W. N., & Reece, R. P., 325.

White, P. Bruce, 172.
—. See Hindle & White, 723.
Whitehead, H. R., & Cox, G. A., , 302.
Whitehead, R. See McGoughey & Whitehead, 430.
Wichels, P., 15.
von Wicht, E., 705.
Wiedmann, F., 6.
Wiethoff, F. See Karman & Wiethoff, 288.
Wight, A. E., 150, 641.
Wigocki, L., 460.
Wilcke, H. L. See Patterson, Wilcke, Murray & Henderson, 439.
Wilkinson, D. E., 701.
Willems, R., 301.
Willey, C. H., 248.
Willfuhr, Fromme & Bruns, 485.
Willis, H. S., 643.
Wills, L., 283.
Wilsdon, A. J., 650.
Wilson, D. R. See Brownlee & Wilson, 105.
—. See Gordon, Brownlee, Wilson & MacLeod, 105, 106.
Wilson, F. H., 167.
Wilson, G. S., 412, 485, 563.
Wilson, I. D., & Morley, L. C., 424.
Windred, G. L. See Krijgsman & Windred, 577.
Wing, H. U. See Sherman & Wing, 179.
Winkel, A., 277.
Winkler, W., 217.
Witenburg, G., 363, 743.
Witkowski, B. See Runge & Witkowski, 530.
Witt, G. See Miethke & Witt, 541.
Witte, J., 227 *bis*, 457, 758.
—, & Zeynelabidin, 758.
Witter, J. F. See Hallman & Witter, 315.
Wohlfeil, T., Sauerzapfe, E., & Lapidas, H., 136.
Wolbach, S. B., & Howe, P. R., 265.
Wolff, W. A., Riegel, C., & Fry, E. G., 276.
Wolters, K. L., 8.
—, & Dehmel, H., 201.
Woodruff, C. E., 114.
Woods, G. M., 566.
Woodward, G. T. See Records, Vawter, Baker & Woodward, 616.
Wooldridge, G. H. See Minett, Wooldridge & Sheather, 388.
Wooldridge, W. R., 382.
Wright, C. W. B. See Stewart & Wright, 539.
Wright, N. C., 298.
Wright, W. H., Bozicevich, J., Underwood, P. C., & Schaffer, J. M., 275.
—. See Underwood & Wright, 127.
—. See Schwartz, Imes & Wright, 367.
Wulff, A., 89.
Wyman, E. T., & Butler, A. M., 54.
Wysmann, E., 666 *bis*.

Y

Yakimoff, W. L., 21, 566, 714.
—, & Gousseff, W. F., 714.
—, & Lewkowitsch, F. E. N., 339.
—, & Matikaschwili, I., 21 *qu it*.
—, Gousseff, W. F., & Matiskaschwili, I. L., 161.
—, —, & Nezwetaïeff, N., 22.
—, —, & Rastegaïeff, E. F., 337.
—, Matikaschwili, I. L., & Lewkowitsch, E. N., 161 *bis*.
—, Nezwetaïeff, N. W., & Petunina, P. I., 506.
—, Gousseff, W., Mezwetaieff, M. W., & Rastegaïeff, E. F., 564.
—, Matikaschwili, I. L., Rastegaïeff, E. F., & Lewkowitsch, E. N., 337.
Yakimoff, W. P., 424.
Yale, M. W., 537.
Yorke, W., Murgatroyd, F., & Hawking, F., 243.
Yoshihara, R., 500.
Young, T. D., 383.
—, & Rabagliati, D. S., 178.

Z

Zaessinger, J. See Ball, Zaessinger & Martin, 669.
Zagrodzki, K., 762.
Zaizen, K. See Konno & Zaizen, 500.
Zammitt, T., & Debono, J. E., 16.
Zawadowsky, M. M., & Zvjaguintzev, S. N., 436.
de Zeeuw, F. A., 257.
Zeitoun, E. See Goret & Zeitoun, 371.
Zeller, H., 321 *bis*.
—, & Beller, K., 648.
—, & Stockmayer, W., 327.
—, Gildemeister, E., & Hilgers, P., 355.
Zepp, H. D. See Kuttner & Zepp, 320.
Zeynelabidin. See Witte & Zeynelabidin, 758.
Zeynelabidin, H., 325.
Zieger, K., 549.
Ziegler, M., & Bergmann, G., 305.
Zimmermann, G., 628.
Zimmermann, K., 182.
Zinth, M., 564.
Zorn, W., Krallinger, H., Schneider, K. T., & Schott, A., 187.
Zottner, G., 568, 621 *bis*.
—. See Velu & Zottner, 104, 481, 542, 561 *bis*, 644.
—. See Velu, Zottner & Ipousteguy, 24, 542.
Zuelzer, M., 30.
—. See Kross & Zuelzer, 30.
Zunker, 738.
Zunker, M., 739.
Zvjaguintzev, S. N. See Zawadowsky & Zvjaguintzev, 436.
Zwarenstein, H. See Schrire & Zwarenstein, 632.
Zwick, Ernst, & Dahmen, 699.
Zwijnenberg, H. A., 261.

SUBJECT INDEX

Classification of subject headings is made strictly according to titles of papers. In preparing the subject headings no search is made of the text of the papers or of the abstracts: the references shown under any particular heading are, therefore, not the only headings under which the subject concerned is dealt with.

A PAGE

ABATTOIRS.
Observations on the bacterial flora of some slaughter-houses 384
Slaughter-house reform 674
Abattoir returns in Germany for 1932 794
ABOMASUM.
On two unrecorded nematodes from the abomasum of cattle in India 250
ABORTION, GENERAL. See also *Bacterium abortus equi* infection, *Bact. abortus ovis* infection, *Bact. equirulis* infection, Brucella infection in horses, Brucella infection in swine, *Br. abortus* infection in cattle, *Mycobacterium tuberculosis* infection in swine, avian type, Paratyphoid group infection, horses, Spirillum infection, Streptococcus infection in horses, Trichomonas infection in cattle.
Abortion in ewes in Canterbury, New Zealand 78
Abortion in horses in Kentucky 174
Contagious abortion of sheep and goats in Cyprus 14
ACARI. See Mites.
ACETONAEMIA.
Bicarbonate injections against acetonaemia in the cow .. 387
ACID-FAST BACILLI. See *Mycobacterium*.
ACIDS. See Hydrocyanic acid, Nitric acid, Sulphuric acid.
ACORN POISONING.
Acorn poisoning in cattle 777
ACRIDINE DERIVATIVES.
Chemotherapy of mastitis with acridine derivatives 585
ACTINOBACILLUS INFECTION.
Actinomycosis and actinobacillosis 19
Actinobacillosis of cattle in the U.S.A. 220
Fatal case of actinobacillosis of man 652
ACTINOMYCES.
Actinomycosis and actinobacillosis 19
Lesions in the stomach of a dog simulating actinomycosis .. 20
Pleomorphic organism showing relationships between staphylococci and actinomycetes 220
Sensitivity of tuberculous guinea pigs to actinomyces extracts 256
Study of actinomycosis 334
An acid-fast *Actinomyces* obtained from lesions resembling bovine tuberculosis 334
Actinomycosis of the udder in the sow 423
Mycotic dermatitis in the calf 505
A. NECROPHORUS.
A study of twelve strains 711
Necrobacillosis in the horse 160
A. necrophorus infection in lambs 120
ACTINOMYCOSIS. See *Actinomyces*.
ADRENAL GLAND.
The suprarenal cortex 286
Bactericidal properties of adrenal extracts 763
ADRENALINE.
Mobilization of haematozoa in the peripheral circulation under the influence of adrenaline 231
AEDES.
Transfer of yellow fever virus from female to male *A. aegypti* 108
AEGYPTIANELLA PULLORUM INFECTION.
A. pullorum in the fowl in South Africa 102
Mortality in fowls due to *A. pullorum* 567
Transmission of *A. pullorum* to fowls by ticks of the genus *Argas* 568
AELUROSTRONGYLUS.
A. abstrusus, lungworm of the cat 523
AFRICA. See under name of territory.
AFRICAN HORSE-SICKNESS. See Horse-sickness.
AGALACTIA, GENERAL.
Treatment of agalactia in sows with pituitrin 387
AGALACTIA, CONTAGIOUS.
Growth phases of agalactia virus on liquid and solid media .. 725
Serum therapy of agalactia 58
Treatment of agalactia of the sheep and goat with "stovarsol" 58, 444
AGGLUTINATION. See Agglutinins.
AGGLUTININS. See also Tests, serological [agglutination] and under name of specific infection.
Changes in bacterial volume as the result of specific agglutination 257
Demonstration of agglutinins for *Mycobacterium tuberculosis* 526
AGRICULTURE, GENERAL.
Science and agriculture in U.S.S.R. 398
Register of agricultural research in progress in Australia .. 633
ALCOHOL.
Alcohol is not always bacteria-free 504
ALGERIA. See *Phlebotomus*.
ALIMENTARY TRACT. See also Intestines, Stomach.
Studies on the alimentary tract of the Merino sheep in South Africa 678
ALLERGY. See also Anaphylaxis, Tests, skin.
Phenomenon of local skin reactivity to bacterial filtrates in its relation to bacterial hypersensitiveness 173
Histological studies of hypersensitive reactions 116
Tuberculin allergy of the blood of the guinea pig, measured by respirometry 115
Tuberculin allergy of human blood and respirometry 115
Progress of allergy in the guinea pig injected with tubercle bacilli 369
Haemorrhagic allergy. Relation of Shwartzman's phenomenon to Arthus' phenomenon 116
Allergy and blood coagulation 174
Relation of allergy to general resistance in streptococcic infection 368
Duration of cutaneous allergy following injection of tubercle bacilli 369
Nature and role of bacterial allergy 443
ALOPECIA.
Alopecia in the ox caused by formaldehyde 678
AMAUROSIS. See Blindness.
AMNION.
Structure and function of the amniotic villi of the cow .. 65
AMOEBA INFECTION.
Intestinal lesions associated with amoebic infection in man and lower animals 614
AMPHISTOMA.
Two amphistome cercariae and their adults 38
AMYLOID DEGENERATION.
Amyloid degeneration in animals 670
"ANABACTERIA."
New method of vaccination by "anabacteria" 373
ANACHORESIS.
Anachoresis of tubercle bacilli 90
ANAEMIA.
Bovine.
A transmissible bovine anaemia and its relation to leucosis 767
Equine infectious.
Equine infectious anaemia 238, 353
Equine infectious anaemia in Germany 478, 795
Equine infectious anaemia in Sweden 451
Equine infectious anaemia in Morocco in 1932 354
Diagnosis of 193
Diagnosis of, by the blood picture 654
Haematological studies in 353
Variability and ultrafiltrability of the virus of 511
Porcine.
Blood picture in anaemia of suckling pigs 177
Action of iron sulphate against anaemia of suckling pigs .. 177
Anaemia of piglets in England 669
Control of anaemia in young pigs 765
ANAEROBES, GENERAL. See also *Clostridium*.
General.
Incidence of anaerobic, filter-passing organisms in normal and in abnormal respiratory tract conditions 18
Cultivation.
Anaerobic cultivation 70
Use of reduced iron for 395
Semi-solid medium for 395
Fortner method for the diagnosis of anaerobes 785
ANAESOTUBERCULIN. See *Mycobacterium tuberculosis* infection, general, diagnosis.
ANAESTHESIA. See also Chloral hydrate, Ether, "Evipan," "Pernocton."
Nerve blocking in the dehorning of cattle 447
Basal narcosis in the dog 543

PAGE

ANAPHYLAXIS.
Anaphylaxis in cattle due to *Hypoderma* larvae 739
ANAPLASMA INFECTION. See also "Tristeza."
Bovine.
Anaplasmosis in East Africa 143, 297, 685, 713
Anaplasmosis in cattle in North Australia 221
Anaplasmosis in Southern Rhodesia 555
A. marginale in Russia 566
Anaplasmosis in U.S.A. 101, 222, 715
Anaplasmosis in cattle in Venezuela 715
Nature of anaplasma 336
Observations on anaplasmosis 23
Transmission of anaplasmosis by horseflies 25
Transmission of anaplasmosis by ticks 101, 244, 245, 566
Deer as carriers of anaplasmosis 566
Attempts to produce premunition in bovine anaplasmosis 25
Morphology of anaplasma 566
A. centrale in cattle 566
Splenectomy in cattle and sheep in relation to anaplasmosis 566
Dogs not susceptible to bovine anaplasmosis 688
Treatment of bovine anaplasmosis with "gonacrine" .. 193
Treatment of bovine anaplasmosis with "novarsenobillon" 715
Ovine.
Observations on anaplasmosis in France 608
Splenectomy in cattle and sheep in relation to anaplasmosis 566
A. CENTRALE INFECTION. See Anaplasma infection, bovine.
A. MARGINALE INFECTION. See Anaplasma infection, bovine.
ANATOMY. See Lymphatic system, Pelvis.
ANATOXINS. See Bacteria, general, toxins.
ANCYLOSTOMA.
Prenatal infection with the dog hookworm, *A. caninum* .. 40
New intradermal reaction in ancylostomiasis 250
Factors influencing the development of ancylostoma eggs .. 365
ANIMAL HUSBANDRY. See Zootechny.
ANTELOPES. See *Trypanosoma rhodesiense*.
ANTHELMINTICS. See also Antimony preparations, Arecoline, N-Butylidene chloride, Carbon disulphide, Copper sulphate, "Fouadin," "Metaphen," Nicotine sulphate, "Panserapis," Salt, Santonin, Sodium disulphonate.
Recent advances in the knowledge of anthelmintics 585
Treatment for the helminthiases of horses 59, 709
Administration of anthelmintics to horses in bran 674
Anthelmintic treatment of small ruminants 674
Treatment of helminthiasis in sheep by pasture rotation and drug treatment 274
Parasitological field trials with sheep 540
Anthelmintics for fowls 675, 773
ANTHRAX. See *Bacillus anthracis* infection.
ANTIBODIES. See also Antigens, under name of specific infection and of different antibodies.
Nature of antibodies 373
Electric charge of antibodies 255
Antibodies in placental extracts 256
Demonstration of agglutinins and complement-fixing antibodies with a suspension of tubercle bacilli 526
Accuracy of the skin test in chinchilla rabbits in determining the strengths of streptococcal toxins and antitoxins .. 757
Increase in antibody formation by non-specific stimulation therapy 764
ANTIGENS. See also Antibodies and under name of specific disease.
Antigenic powers of virulent and attenuated bacteria .. 442
Antigenic substances of *Clostridium parabotulinum* 649
ANTIMONY PREPARATIONS. See also "Dn 12".
Method of testing trivalent antimony preparations on opisthorchiasis in the cat 386
Action of antimonious drugs on helminths of pigs and dogs 127
Action of certain organic compounds of antimony on leishmania sera 723
ANTISEPTICS. See Disinfectants.
ANTISERUM.
General.
Antilytic sera 44
State control of veterinary sera and vaccines in Germany .. 293
Method of examining sera by their sensitizing action on the flocculation of ferric hydroxide 45
Serum and its critical temperature 115
Serological studies on azoproteins. Antigens containing azocomponents with aliphatic side chains 764
Treatment of purpura haemorrhagica in the horse with specific serum 667

PAGE

Antibacterial.
Bactericidal power of normal serum 475
Action of anti-anthrax serum 200
Precipitating power of serum of *Bacterium pullorum* infected fowls 500
Prevention and treatment of *Brucella abortus* infection in guinea pigs with immune serum 502
Agglutinins for *Br. abortus* in human sera 15
Preparation of antistreptococcus serum 307
Separation of agglutinin and antisepticaemic property of antistreptococcal serum 764
Antiprotozoan.
Action of sera on trypanosomes pathogenic for man .. 510
Action of human serum *in vitro* on strains of *Tryp. rhodesiense* 510, 721
Antivenin.
Preparation, standardization and use of concentrated African antivenom serum in the treatment of snake-bite 273
Serum against virus diseases.
Serum therapy of agalactia 58
Antiserum against foot and mouth disease 478
Serotherapy for swine fever 104, 514
Action of the serum against rinderpest 428
Duration of immunity in calves inoculated by the goat virus *cum* serum method against rinderpest 615
ANTITOXINS. See Antibodies.
ANTIVIRUS.
Besredka antivirus 257
Antivirus therapy in bovine streptococcus mastitis 307
Prophylactic and curative value of antivirus for brucella infections in man and animals 329
Curative value of antivirus 622
APES. See *Mycobacterium tuberculosis* infection in monkeys.
APHOSPHOROSIS. See Phosphorus.
APLOPAPPUS HETEROPHYLLUS.
Trembles (or milk sickness). *A. heterophyllus* poisoning in cattle 778
APPARATUS. See also Calipers, Colorimeter, Pipettes, Syringes, Tracheal canula.
New apparatus for treatment of wounds and fly-struck areas on sheep 291
Apparatus for the simultaneous pipetting of large numbers of equal quantities of fluids 397
The "rotette", an apparatus for handling small quantities of liquids with rapidity and precision 71
Pressure steam disinfector for disinfestation and disinfection, by dry heat and/or gaseous disinfectants 398
Intravenous calcium therapy with the Perleberg apparatus .. 490
New instrument for swine erysipelas immunization 786
New uterus pump 549
Electrical driving stick for livestock 786
ARECOLINE.
Treatment of intestinal helminthiases of the fowl and the pigeon with arecoline hydrobromide 59
ARGAS.
Transmission of *Aegyptianella pullorum* to fowls by ticks of the genus *Argas* 568
ARGENTINE. See Brucella infection in man, distribution, Poisoning, poisonous plants.
ARSENIC.
Therapy.
Resistance of trypanosomes of man to arsenical drugs .. 443
Demonstration of arsenic in spirochaetes and trypanosomes 774
Poisoning.
Toxicity to grazing animals of grass sprayed with sodium arsenite 626
ARTERIES. See Blood vessels.
ARTHRITIS.
Experimental erysipelothritic arthritis in lambs 207
Causation and treatment of arthritis 261
Staphylococcal arthritis in turkeys 308
ARTHROPODA. See also under name of genus.
Arthropod parasites in domestic and wild animals in the Dutch East Indies 691
ARTHUS' PHENOMENON.
Relation of Shwartzman's phenomenon to Arthus' phenomenon 116
"ASCARIDOL."
"Ascaridol" (Bayer) as treatment for roundworms and tapeworms in small animals 773
ASCARIDIA.
Development of *A. lineata* in chickens 40
Age resistance of chickens to *A. lineata* 40
ASCARIDS. See also *Ascaris, Toxocara.*
Positive allergic reaction in a horse infected with ascarids .. 529

PAGE

ASCARIDS [cont'd].
Nicotine sulphate as a vermifuge for ascarids of poultry .. 773
ASCARIS.
Ascariasis in calves in Nigeria .. 74
Identity of calf ascarids .. 750
Ascaridiasis in horses .. 435
Immunization of the mouse against experimental ascaris infestation .. 749
Chromosome apparatus of *A. lumbricoides* and *A. vitulorum* 750
Ascaris larvae as carriers of disease .. 750
ASCORBIC ACID.
Ascorbic acid (vitamin C) and glutathione in animal tissues 293
ATAXIA.
Enzootic ataxia of lambs in Western Australia .. 535
"ATEBRIN."
Prophylaxis of malaria by "atebrin" .. 180
AUJESZKY'S DISEASE.
Aujeszky's disease .. 655, 731
Pathology of .. 235, 347
Cultivation of the virus of .. 572
Research with the virus of .. 234, 235
In British Guiana .. 687
In Denmark .. 34
In France .. 468
In Holland .. 35, 690, 794
In Morocco .. 468
In the cat .. 235
In the pig .. 165
In the rabbit .. 235
In birds .. 235, 572
In the jackal .. 572
In the hedgehog .. 235
In the tortoise .. 572
Transmission of .. 235
Genetic constitution of mice infected with .. 625
AUSTRALIA. See also Agriculture, general, Anaplasma infection, bovine, Ataxia, Babesia infection, general, *Bacillus anthracis* infection, general, *Bacterium pullorum* infection, general, Blackleg, Blowflies, *Brucella abortus* infection in cattle, general, *Clostridium oedematiens, Cl. parabotulinum*, Deficiency diseases, *Haemonchus contortus*, Helminth parasites general, bird parasites, Hookworms, Keds, *Lyperosia*, Pastures, Pleuro-pneumonia, contagious bovine, Poisoning, poisonous plants, Poultry, general, Psittacosis, Reports, Research Institutes, Senecio, Streptococcal mastitis, Thyroid gland, Ticks, general, Trematodes, *Trichostrongylus*.
Diseases of livestock in Australia .. 552, 553, 554
AUSTRIA. See Brucella infection in man, distribution, Brucella infection in swine, Oestridae.
AUXIN.
A vitamin necessary for the growth of *Clostridium sporogenes*: its relation to auxin and other growth factors .. 17
AVIAN PEST. See Newcastle disease.
AVITAMINOSIS. See Vitamins.
AZOPROTEINS.
Serological studies on azoproteins. Antigens containing azocomponents with aliphatic side chains .. 764
AZOTURIA. See Myoglobinuria paralytica, equine.

B

BABESIA.
Piroplasms, with special reference to the types found in Australian "redwater" .. 505
Classification of piroplasms .. 608
BABESIA INFECTION. See also "Tristeza".
Bovine.
Pathology of piroplasmosis .. 725
War against cattle fever ticks and piroplasms in America .. 618
Piroplasmosis in Ceylon in 1932 .. 191
Bovine piroplasmoses of Colombia and their treatment .. 506
Bovine piroplasmosis in Greece .. 506
Piroplasmosis in cattle in India .. 401
Piroplasmosis and anaplasmosis in Kenya .. 143
Immunity of Madagascan Zebus against piroplasmosis .. 506
Piroplasmosis. Research at Muktesar .. 552
Piroplasmosis in New South Wales .. 505, 552
Immunization against bovine piroplasmosis in North Africa (1930-1932) .. 506
Piroplasmosis in Southern Rhodesia .. 555
Piroplasmosis in Turkey .. 259
Piroplasmosis in Uganda .. 713
Immunization against piroplasmosis .. 24
North African piroplasmoses and their treatment .. 24

PAGE

Treatment of bovine piroplasmosis with "gonacrine" in Morocco .. 193
Treatment of bovine piroplasmosis with "todorit" .. 444
Canine.
Development of *B. canis* in *Dermacentor reticulatus* .. 423
Canine piroplasmosis .. 507
Vector of *B. gibsoni* of the dog .. 507
Control of piroplasmosis in East Africa .. 685
Chemotherapy of *B. canis* infection in dogs .. 713
Caprine.
B. sergenti in the goat in India .. 401
Equine.
B. equi .. 161, 462
Equine piroplasmosis in the Bavarian Highlands .. 462
Equine piroplasmosis in India .. 609
True equine piroplasmosis and "piroblue" .. 609
"Graduated tube method" for estimation of erythrocyte content of blood in treatment of equine piroplasmosis .. 292
Transmission of *B. caballi* from dam to foetus .. 713
Ovine.
Ovine piroplasmosis .. 221, 608
Carrier of sheep piroplasmosis in Azerbaijan .. 608
B. motasi in sheep in Northern Nigeria .. 608
B. CABALLI. See Babesia infection, equine.
B. CANIS. See Babesia infection, canine.
B. EQUI. See Babesia infection, equine.
B. GIBSONI. See Babesia infection, canine.
B. MOTASI. See Babesia infection, ovine.
B. SERGENTI. See Babesia infection, caprine.
BABESIELLA. See *Babesia*.
BACILLARY WHITE DIARRHOEA. See *Bacterium pullorum* infection.
BACILLUS ABORTIVO-EQUINUS. See *Bacterium abortus equi*.
B. ABORTUS. See *Brucella abortus*.
B. ABORTUS EQUI. See *Bacterium abortus equi*.
B. ANTHRACIS.
The specific polysaccharides of anthrax bacilli .. 87
Anaerobic culture of the anthrax bacillus .. 200
Attenuation of *B. anthracis* by rabbit peritoneal lymph .. 639
B. ANTHRACIS INFECTION.
General.
Anthrax as an earth-borne epizootic .. 147
Mode of infection in anthrax .. 148
Anthrax infection *via* the conjunctiva .. 696
Role of tanneries in the epidemiology of anthrax .. 148
Aetiology and pathogenesis of anthrax .. 309
Role of the skin in anthrax .. 309
Localization and sporulation of *B. anthracis* in hides .. 409
Anthrax in animals in zoological gardens .. 639
Anthrax in deer and a fox .. 48
Anthrax in cats .. 409
Anthrax in Europe .. 374
Anthrax in domestic animals in Denmark, 1901 to 1931 .. 86
Anthrax in Great Britain in 1932 .. 189
Anthrax in Poland .. 87
Anthrax in Sweden .. 451
Anthrax in Nigeria .. 139
Anthrax in Tanganyika Territory .. 296
Anthrax in Burma in 1932 .. 190
Anthrax in Ceylon .. 191, 593
Anthrax in New South Wales .. 552
Control.
Control of anthrax .. 478
Removal of *B. anthracis* from tannery effluents .. 640
Disinfection of anthrax hides .. 6
Diagnosis.
Reliability of the Ascoli test .. 580
Laboratory diagnosis .. 695
Immunization.
Vaccination against anthrax .. 308
Anthrax immunity .. 309
Besredka's intradermal vaccine .. 148
Single intradermal vaccination in Morocco .. 193
Pathogenic power of *B. anthracis* and of spore vaccines .. 200
Anti-anthrax serum .. 200
Anti-anthrax vaccine in the rabbit .. 308
Active immunization with heterophile antigen .. 309
"Carbozoo" vaccine against anthrax .. 590
"Carbozoo" vaccine in Jugoslavia .. 200
Glucoside vaccine .. 454, 696
Glucoside vaccine in Czechoslovakia .. 410, 497, 640
Immunization of the dog against anthrax .. 696
Experimental anti-anthrax immunity in the fowl .. 639

PAGE

B. BOTULINUS. See *Clostridium botulinum.*
B. BOVISEPTICUS. See *Pasteurella boviseptica.*
B. CHAUVOEI. See *Clostridium chauvoei.*
B. COLI. See *Bacterium coli.*
B. GALLINARUM. See *Bacterium sanguinarium.*
B. GIGAS. See *Clostridium gigas.*
B. INFLUENZAE. See *Haemophilus influenzae.*
B. OF JOHNE'S DISEASE. See *Mycobacterium paratuberculosis.*
B. MALLEI. See *Pfeifferella mallei.*
B. MELITENSIS. See *Brucella melitensis.*
B. NECROPHORUS. See *Actinomyces necrophorus.*
B. NEPHRITIDIS EQUI. See *Bacterium equirulis.*
B. OEDEMATIENS. See *Clostridium oedematiens.*
B. OEDEMATIS MALIGNI. See *Clostridium septique.*
B. OVITOXICUS. See *Clostridium ovitoxicum.*
B. PALUDIS. See *Clostridium paludis.*
B. PARATUBERCULOSIS. See *Mycobacterium paratuberculosis.*
B. PERFRINGENS. See *Clostridium welchii.*
B. PHLEGMONIS EMPHYSEMATOSAE. See *Clostridium welchii.*
B. OF PREISZ NOCARD. See *Corynebacterium pseudotuberculosis ovis.*
B. PSEUDOTUBERCULOSIS OVIS. See *Corynebacterium pseudotuberculosis ovis.*
B. PSEUDOTUBERCULOSIS RODENTIUM. See *Pasteurella pseudotuberculosis.*
B. PULLORUM. See *Bacterium pullorum.*
B. PYOCYANEUS. See *Pseudomonas pyocyanea.*
B. PYOGENES. See *Corynebacterium pyogenes.*
B. SANGUINARIUM. See *Bacterium sanguinarium.*
B. SUIPESTIFER. See *Bacterium suipestifer.*
B. SUISEPTICUS. See *Pasteurella suiseptica.*
B. OF SWINE ERYSIPELAS. See *Erysipelothrix rhusiopathiae.*
B. TETANI. See *Clostridium tetani.*
B. TUBERCULOSIS. See *Mycobacterium tuberculosis.*
B. WELCHII. See *Clostridium welchii.*

BACTERIA, GENERAL. See also Allergy, "Anabacteria," Anaerobes, *Bacillus*, *Bacterium*, *Brucella*, *Clostridium*, *Corynebacterium*, *Erysipelothrix*, Food poisoning, *Haemophilus*, Lamb dysentery, Milk, bacterial content, *Mycobacterium*, Paratyphoid group, *Pasteurella*, *Pfeifferella*, *Pseudomonas*, Pulpy kidney disease, *Staphylococcus*, *Streptococcus.*

General.
Bacillus growing in symbiosis with fowl spirochaetes .. 16
Bacterial diseases in South Africa 79
Manual of veterinary bacteriology 194
Hormonal integration of bacteria 219
Immunological studies with phage-coated bacteria.. .. 256
Changes in bacterial volume as the result of specific agglutination 257
A new species of pathogenic organism from circling disease of sheep in New Zealand 461
Alcohol is not always bacteria-free 504
Bacteriology, immunobiology and cosmic rays 663
Post-mortem bacterial invasion in animals 712
The bacterial flora developing on stored lean meat.. .. 384

Attenuated strains.
Antigenic powers of attenuated bacteria 442

Bacterial antagonism.
Bacterial antagonism 218, 219

Bactericidal substances. See also Bacteriophage.
Bactericidal properties of leucocytes and blood-platelets .. 763
Bactericidal properties of adrenal extracts 763

Classification.
Present status of bacterial nomenclature 161

Dissociation.
Bacterial variation, with special reference to pleomorphism and filtrability 335

Electrical conductivity.
Changes in electrical conductivity in bacterial cultures .. 462

Filtrable stage.
Attempt to confirm existence of filtrable cycle of bacteria by use of "K" medium 19
Effects of media on bacterial filtrability 650

Flora of abattoirs.
Bacterial flora of some slaughter-houses 384

Flora of organs.
Incidence of anaerobic, filter-passing organisms in normal and abnormal respiratory tract conditions 18

PAGE

Bacterial flora of intestinal contents of baby chicks affected with *Bacterium pullorum* 11
Germ contents of the foetal fluids and of the foetuses of healthy horses and cattle 161
Presence of bacteria in healthy and diseased genital organs of cattle 217
Occurrence of bacteria, especially streptococci, in white mice 146
Bacterial flora in the oral cavity, tonsils and the accompanying lymph glands of the head of swine 217
Bacteriology of the normal and infected udder .. 217, 304

Metabolism.
Pigment-storage by living bacteria 100
Respiration of facultative aerobic pathogenic bacteria .. 18
Effect of electrolytes on phosphorus equilibrium of bacterial cells 100
Effect of carbon dioxide on bacterial growth 219
Tryptophane and the growth of bacteria 335
Mutations as governing bacterial characters and serologic reactions 738

Technique [general]. See also Filtration, Staining.
Nature of the effect of carbon dioxide under pressure upon bacteria 336
Differentiation between Gram-positive and Gram-negative micro-organisms by the use of enzymes 650
The Gram reaction and the electric charge of bacteria .. 336
Separation of agglutinin and antisepticaemic property of antistreptococcal serum by dissociation of the coccus-antibody complex 764
The Fortner method for the diagnosis of anaerobes .. 785
Differentiation of blackleg and parablackleg bacilli by haemolysis 785

Technique [counts].
Criticism of methods of counting bacteria 136
Leucocyte content of milk as correlated with bacterial count and hydrogen ion concentration for detection of mastitis 305
Calculation method and Wright's method of counting bacteria 614
Comparison of the enumeration of bacteria by means of solid and liquid media 784, 785

Technique [cultivation]. See also *Mycobacterium tuberculosis*, cultivation.
Culture method for gas gangrene diagnosis 650
Measurement of the opacity of bacterial cultures with photo-electric cell 488
Pure culture study of bacteria 495

Toxins.
Resistance of toxins to high pressures 72
Accuracy of the skin test in chinchilla rabbits in titration of streptococcal toxins and anti-toxins 757
Destruction of botulinum toxin by heat 99
Botulinum toxin 649
Influence of diluents and peptone on toxicity of tetanus toxin 258
Use of tetanus anatoxin in veterinary medicine 762

Viability.
Resistance of bacteria to high pressures 72

BACTERIOPHAGE.
Inactivation of antistreptococcus bacteriophage by animal fluids 166
Heterogeneity of bacteriophages 240
Role of bacteriophage in natural purification 241
A specific soluble substance from bacteriophages 256
Evidence of particulate nature of bacteriophage 358
Specific agglutination of bacteriophage particles 358

BACTERIOSTASIS.
On so-called reversed selective bacteriostasis 218

BACTERIUM ABORTUM. See *Brucella abortus.*

BACT. ABORTUS EQUI INFECTION. See also "Joint ill".
Bact. abortus equi in mares in India. Vaccination treatment 401
Immunization against equine infectious abortion 709

BACT. ABORTUS OVIS INFECTION.
Bact. abortus ovis infection in the ewe 600

BACT. AEROGENES.
Bact. aerogenes in milk and bovine faeces 270

BACT. AERTRYCKE INFECTION.
Inheritance of resistance to *Bact. aertrycke* in mice 12
Bact. aertrycke infection of pigeons 210
Genetic constitution in mice as differentiated by mouse typhoid 625
Bact. aertrycke in colitis of foals 709
Bact. aertrycke in two dogs affected with distemper.. .. 709
Immunizing fractions isolated from *Bact. aertrycke* 762

PAGE

BACT. COLI. See also " Joint ill ".
Appearances produced in blood agar by bacteria of *Bact. coli* group 154
Bact. coli septicaemia of verminous origin in the mule .. 209
Significance of *Bact. coli* in milk 179, 535
Can *Bact. coli* be considered as an organism indicating unclean milking? 538
Bact. coli in milk and bovine faeces 270
Bact. coli infection in suckling pigs 695
Apparent cause of infectious enteritis of lambs 600
BACT. ENTERITIDIS INFECTION.
Epidemic infection of guinea-pigs with *Bact. enteritidis* .. 155
Bact. enteritidis infection of cattle 319
Diagnosis of Gärtner infection of calves 319
BACT. EQUIRULIS INFECTION. See also " Joint ill ".
Bact. equirulis as cause of equine abortion 174
Bact. equirulis septicaemia of verminous origin, in the mule 209
BACT. GALLINARUM. See *Bacterium sanguinarium.*
BACT. PSEUDOMALLEI. See *Pfeifferella pseudomallei.*
BACT. PSITTACOSIS.
Bact. psittacosis 736
BACT. PULLORUM.
A variant in cultures of *Bact. pullorum* 12
Influence of heat on receptors of *Bact. pullorum* 500
Virulence of strains of *Bact. pullorum* 601
BACT. PULLORUM INFECTION [BACILLARY WHITE DIARRHOEA].
General.
Bacterial flora of intestinal contents of baby chicks affected with *Bact. pullorum* 11
Agglutinin content of blood of fowls infected with *Bact. pullorum* 210
Recovery of *Bact. pullorum* from faeces of adult carriers.. 601
Prophylaxis of *Bact. pullorum* infection 601
Experimental infection of pigs with *Bact. pullorum* .. 709
Bact. pullorum in hen's eggs 601
Bact. pullorum infection in Denmark 416
Bact. pullorum infection in Sweden 451
Bact. pullorum infection in Queensland 554
Control.
Control of *Bact. pullorum* infection 209
Control of *Bact. pullorum* infection in U.S.A. 689
Diagnosis [miscellaneous].
Serological tests 95
Diagnosis of *Bact. pullorum* infection 561
Diagnosis by complement-fixation and precipitation .. 500
Diagnosis [agglutination test].
Precipitating power of serum of infected fowls in connection with agglutination 500
Value of fresh blood rapid agglutination test 500
An apparatus for pipetting serum in making the agglutination test 500
Stained antigen agglutination test 688
Rapid agglutination test 690
Standardization of the agglutination test 789
BACT. PURIFACIENS.
Caseous suppuration of the sheep due to *Bact. purifaciens* .. 561
BACT. SANGUINARIUM INFECTION.
Isolation of *Bact. sanguinarium* from eggs 210
Fowl typhoid in Turkey 259
A chronic carrier of fowl typhoid of turkeys 317
Fowl typhoid in guinea fowls 317
Prophylaxis of fowl typhoid 601
BACT. SUIPESTIFER INFECTION.
Diseases of swine caused by *Bact. suipestifer* 317
Bact. suipestifer infections in man 320
Differentiation of *Bact. suipestifer* from closely related bacteria 710
BACT. TULARENSE. See *Pasteurella tularensis.*
BADGERS. See Eimeria infection, general, Lungworms.
BAILEYA MULTIRADIATA.
The toxicity of *Baileya multiradiata* for sheep and goats .. 778
BALANTIDIUM.
Feeding reactions of *Balant. coli* from the chimpanzee and pig 343
Specificity in the genus 614
Six new species of 614
Intestinal lesions of balantidial infection in man and lower animals 614
BANG'S DISEASE. See *Brucella abortus* infection in cattle.
BATS. See Helminth parasites, general, *Trypanosoma hippicum.*
BAVARIA. See Germany.
BAYER 205.
Bayer 205 effective against surra in India 401

PAGE

Curative treatment of surra in equines by 486
Treatment of surra in dogs with 26
Treatment of *Trypanosoma annamense* infection in cats with 225
BCG. See *Mycobacterium tuberculosis*, BCG strain.
BDELLOLARYNX.
B. uniseriatus Malloch, a blood-sucking fly, in the Transvaal 741
BEARS. See *Mycobacterium tuberculosis* infection, general, *Trichinella.*
BECHUANALAND PROTECTORATE. See *Glossina.*
BEETROOT POISONING.
Beetroot poisoning in pigs 778
BELGIAN CONGO. See Brucella infection in man, distribution, Entomology, general, Pleuro-pneumonia, contagious bovine, general, *Theileria parva* infection, Ticks, general, Trypanosomes, general.
BELGIUM. See *Mycobacterium tuberculosis*, BCG strain, *Mycobact. tuberculosis* infection in cattle, control.
BENNETT'S TEST. See *Trypanosoma evansi* infection, diagnosis.
BILE. See also Bilirubin.
Action of bile on the swine erysipelas bacillus.. 316
Paratyphoid bacteria in the bile of pigs 460
Effect of surgical obstruction of the normal bile flow.. .. 677
BILHARZIA. See *Schistosoma.*
BILIRUBIN.
Bilirubin metabolism in herbivora 135
BIOCHEMISTRY. See also Blood, chemical composition, Endocrine glands, Metabolism, Nutrition.
Practical physiological chemistry 196
An introduction to biochemistry 692
BIOLOGY.
Modern theories of development 81
BIRD MALARIA. See Plasmodium infection, avian.
BIRDS, GENERAL. See Budgerigars, Canaries, Conures, Ducks, Fowls, Geese, Owls, Parrotlets, Parrots, Pigeons, Sparrow-hawk, Turkeys.
General. See Disinfection.
Bacterial diseases. See *Clostridium oedematiens*, Paratyphoid group of bacteria.
Helminth parasites. See Helminth parasites general, bird parasites, *Trichostrongylus.*
Protozoan diseases. See Eimeria infection, avian, *Haemogregarina.*
Virus diseases. See Aujeszky's disease, Encephalomyelitis, equine.
BITCHES. See Dogs.
BLACK DISEASE. See *Clostridium oedematiens* infection.
BLACKHEAD IN TURKEYS. See *Histomonas meleagridis* infection.
BLACKLEG. See also *Clostridium chauvoei.*
Blackleg aggressin immunization 17
Blackleg in sheep due to shearing 17
Blackleg and gas gangrene 215
Blackleg in swine 421
Blackleg in Burma in 1932 190
Blackleg in Ceylon in 1932 191
Blackleg in Europe 375
Blackleg in New South Wales 552
Blackleg in New Zealand 294
Blackleg in Sweden 451
Blackleg in Tanganyika Territory 296
Blackleg in Turkey 259
BLACKQUARTER. See Blackleg.
BLACK TONGUE.
Black tongue in dogs 381
BLINDNESS.
Amaurosis in calves in India 400, 551
BLOOD. See also Acetonaemia, Anaemia, Antiserum, Eosinophilia, Haemagglutination, Haemolysin, Opsonin, Thrombase.
General.
Immunizing value of the defibrinated anti-swine fever blood.. 104
Length of time blood of slaughtered animals will remain fit for use 55
Nature of the haemopoietic factor in marmite 283
Discolouration of heated blood by streptococci 302
Blood volume determinations in cattle 547
Examination of fresh and oxalated pigs blood 681
Aetiology of blood diseases. A pathogenic agent in normal human bone marrow 768, 769
Chemical composition [general].
Some blood chemical findings and their interpretations in diseases of animals 547

PAGE

BLOOD [cont'd].
Blood of horses affected with myoglobinuria 667
Excretion of sexual hormone in urine and blood of pregnant sows 679
Effect of pregnancy and parturition on some blood and urinary constituents in the ewe 586
Chemical composition [cholesterol].
Cholesterolaemia 284
Chemical composition [ketones]. See also Acetonaemia.
Ketones of blood and urine of cow and ewe 284
Chemical composition [minerals].
Mineral content of the blood serum of cows and calves 290, 768
Electrolyte content in the blood serum of sheep, goats and cows in pregnancy and in milk fever 285
Distribution of calcium between blood plasma and erythrocytes 546
Silica content in blood serum of cattle, sheep, goats and pigs 783
Mineral composition of blood serum of horse and pig .. 587
Calcium and phosphorus content of blood serum in fasting animals after intravenous injection of calcium and phosphorus and after bleeding 68
Magnesium and calcium in blood of sheep and cows .. 630
Chemical composition [proteins].
Protein of ox serum 547
Chemical composition [sugar].
Blood-sugar in trypanosomiasis 464
Blood changes following ingestion of glucose in swine .. 587
Chemical composition [sulphocyanate].
Relationship between trypanosome infection and blood sulphocyanate content 721
Coagulation.
Connection between allergy and blood coagulation .. 174
Corpuscles [general].
Determination of cell volume of blood 291
Corpuscles [red]. See also Anaemia, Blood, picture, Blood, sedimentation rate.
Cholesterolaemia and osmotic resistance of the erythrocytes 284
Distribution of calcium between blood-plasma and erythrocytes 546
"Graduated tube method" for estimation of erythrocyte content of blood 292
Corpuscles [white].
Relationships of leucocytes and streptococci to fibrosis of the udder 305
Leucocytes of fowl blood in fowl paralysis.. 532
Leucocytes in oestral mucus in the mare 680
Bactericidal properties of leucocytes and blood-platelets .. 763
Lymphoid cells of peripheral blood of normal rats and rats infected with *Trypanosoma brucei* 612
A *Rickettsia*-like organism in lymphocytes of sheep .. 518
Groups.
Blood groups in horses 170
Hydrogen ion concentration.
Colorimetric estimation of hydrogen ion concentration of blood 292
Oxygen capacity and pH of blood of healthy and diseased horses and cattle 391
Mineral content. See Blood, chemical composition [minerals].
Picture. See also Blood, corpuscles.
Influence of "neosalvarsan" on blood picture in horse .. 56
Blood picture in anaemia of suckling pigs 177
Blood picture of pigs affected with swine fever, paratyphoid infection, pasteurellosis and pyobacillosis.. 428
Blood picture in strangles 622
Blood picture of horses under intradermopalpebral mallein test 622
Diagnosis of equine infectious anaemia by blood picture.. 654
Blood picture in swine fever 729
Blood picture of cattle and dogs during pregnancy, at parturition and in genital diseases 768
Plasma.
Distribution of calcium between blood-plasma and erythrocytes 546
Platelets.
Method for the enumeration of blood-platelets 291
Bactericidal properties of blood-platelets 763
Sedimentation rate.
Influence of "neosalvarsan" on sedimentation rate of corpuscles in horse 56
Sedimentation rate in pig 488
Velocity of red cell sedimentation in bovines positive and negative to tuberculin 527
Sugar. See Blood, chemical composition [sugar].
Transfusion.
Blood transfusion from animals to human beings 374
Heterohaemotherapy in equine myoglobinuria 667
Blood transfusion in large domestic animals 681
Urea.
Blood-urea in trypanosomiasis 464

BLOOD VESSELS.
Histological changes in middle uterine artery, internal spermatic artery and posterior uterine artery of cattle during pregnancy 392
BLOWFLIES. See also *Chrysomyia*, *Lucilia*.
Sheep blowfly investigations. Experiments on artificial baits 38
Sheep blowfly problem in Australia 109
A fly resistant ram 243
New apparatus for treatment of wounds and fly-struck areas on sheep during shearing and crutching operations .. 291
Blowfly problems. Suggested use of cattle egret bird (*Babulcus coromandus*) 521
Biology of *Brachymeria fonscolombei*, a hymenopterous parasite of blowfly larvae 619
Sheep blowfly traps 521, 619
Influence of temperature on activity of sheep blowflies .. 661
BLUE TONGUE.
Control of blue tongue in East Africa 685
BODIES. See Elementary bodies, Inclusion bodies.
BONE MARROW.
Erysipelothrix rhusiopathiae in bone marrow of a horse .. 207
A pathogenic agent in normal human bone marrow .. 768, 769
BONES.
Investigations into structure of cattle bones, normal and altered by feeding upon rations low in calcium and phosphorus 382
Change in composition of bone of rats on diet poor in inorganic constituents 629
Histological examination of the bones of sheep with chronic fluorine poisoning 779
BOOK REVIEWS. See Text books.
BOOPHILUS.
B. annulatus in U.S.A. 242, 659, 689
Transmission of *Anaplasma* by *B. microplus* 566
BORNA DISEASE.
Filtration of the virus of Borna disease through graded collodion membranes 348
Borna disease in Germany 478, 795
BOTRIOMYCOSIS.
Botriomycosis in the pig 334
Transmission of botriomycosis to mares at mating 766
BOTS. See Oestridae.
BOTULISM. See *Clostridium botulinum* intoxication, *Cl. parabotulinum*.
BOVINE CONTAGIOUS ABORTION. See *Brucella abortus* infection in cattle.
BOVINE TUBERCULOSIS. See *Mycobacterium tuberculosis* infection in cattle.
BRACHYMERIA.
Biology of *B. fonscolombei*, a hymenopterous parasite of blowfly larvae 619
BRADSOT. See Braxy.
BRAIN. See also Circling disease of sheep, *Corynebacterium pyogenes*, Encephalitis, Encephalomalacia, Hydrocephalus.
Cerebral coenurosis in Eritrea 479
Infectious diseases and the brain 665
BRAXY.
Comparison of Iceland and German bradsot (braxy) .. 651
BRAZIL. See also Brucella infection, general.
Prophylaxis of infectious and parasitic diseases of domestic animals of Brazil 404
BREEDING. See also Abortion, Fertility, Insemination, artificial, Oestrum, Reproduction, Spermatozoa, Sterility.
Horse breeding in Estonia and the East Friesian horse .. 137
Biometric research in cattle breeding 138
BRILLIANT GREEN.
Preservation of milk samples with brilliant green 538
BRINE. See Salt.
BRITISH GUIANA. See also Rabies, general, Reports.
Diseases of livestock in British Guiana 686, 687
BRONCHITIS, INFECTIOUS BOVINE.
Infectious bronchitis in cattle 532
BRONCHITIS, PARASITIC. See Lungworms.
BRONCHO-PNEUMONIA.
Broncho-pneumonia of the pig 318
Similarity of virus pneumonia in animals to broncho-pneumonia in man 358
Infectious bronchitis in cattle 532

PAGE

BRUCELLA GROUP, GENERAL.
General.
The systematic position of the brucella 702
Brucellosis 321, 460
Variability of *Br. abortus* 607
Cultivation.
Brucella group in egg media 606
Differentiation.
Swine brucellosis and biology of *Br. abortus* 323
Optimal proportions in agglutination with reference to the antigenic analysis of brucella group 373
Serological types of brucella group 420
Cultural differentiation in the brucella group .. 327, 503
Classification of brucella group 563
Bacteriological relationship of types of brucella 460
Differentiation of brucella types 158, 459
Dissociation.
Dissociation in brucella group 158, 606
Viability.
Viability of *Br. abortus* 705
Biology of brucella 705

BRUCELLA INFECTION, GENERAL. See also *Br. abortus* infection, general, *Br. melitensis* infection.
General.
Inter-relation of strains of brucella 158
Types of brucella found in Holland 604
Susceptibility of laboratory animals to brucella 419
Brucellosis in France 420
Brucella infections in animals and man 494
Conference of Veterinary Services on brucella infection, France 649
Diagnosis.
Comparison of brucella antigens for use in allergic reactions 173
Intradermal reaction in brucella infections 706
Treatment.
Value of antivirus for brucella infections in man and animals 329

BRUCELLA INFECTION IN CATS.
Susceptibility of cats to brucellosis 419

BRUCELLA INFECTION IN DOGS.
Brucella infection in dogs 322

BRUCELLA INFECTION IN FOWLS.
Pathogenicity of *Br. abortus* for fowls 97, 324
Diagnosis of brucellosis of fowls 528

BRUCELLA INFECTION IN GOATS. See also Brucella infection, general.
Immunization of the Maltese goat by cutaneous vaccination 16
Immunization in ovine and caprine brucellosis 329
Prevention of brucella infection in goats in Brazil 707

BRUCELLA INFECTION IN HORSES.
Br. abortus infection in horses 322, 703
Diagnosis of brucellosis in horses 527, 528

BRUCELLA INFECTION IN MAN. See also Brucella infection, general.
General.
Pathogenicity of *Br. melitensis* and *Br. abortus* for human beings 501
Recent investigations on brucellosis 321
Brucella agglutinins in human sera 15, 332
Control of brucella infection in man 707
Undulant fever 14, 15, 159, 332, 421
Relation of bovine contagious abortion to undulant fever in man 96, 328
Cases of undulant fever of bovine origin, (*melitensis* strain) 98
Fresh cheese and undulant fever 124
Brucella infection in employees of packing-houses 327
Forms of human brucelloses 330
Br. abortus infection in man 331, 707
Undulant fever due to *Brucella* of the porcine type – *Br. suis*. Report of milk-borne epidemic 708
Diagnosis
Undulant fever detected by routine examination of sera .. 212
Comparison of Huddleson slide test with macroscopic tube test 326
Distribution.
Abortus fever in Great Britain 212
Br. abortus infection in man in Ireland 330
Undulant fever in France 159, 460
Undulant fever in the Tyrol 649
Occurrence of *abortus* agglutinins in Mittelfranken and Oberpfalz 15
Br. abortus infection in man in Berlin 324
Br. melitensis infections in Messina 98
Undulant fever in the Argentine republic 331

PAGE

Undulant fever in U.S.A. 416
First case of undulant fever in the Belgian Congo 460
Undulant fever of bovine origin in Tunis 460
Abortion and brucella infection in Malta 460
Two outbreaks of undulant fever in Spain 708

BRUCELLA INFECTION IN SHEEP. See also Brucella infection, general.
Allergic reaction in the diagnosis of ovine *Br. melitensis* infection 212
Immunization in ovine and caprine brucellosis 329
Resuscitation of agglutinins in sheep infected with brucella 579

BRUCELLA INFECTION IN SWINE.
Brucella infection in swine 323, 327, 704
Brucellosis in swine in Virginia 416
Spondylitis in brucella infection in swine 606
Br. abortus infection of swine in Austria 605
Isolation of bacteria of brucella group from apparently healthy swine 606
Diagnosis of brucella infection in swine 528, 606

BR. ABORTUS. See Brucella group, general.

BR. ABORTUS, PORCINE TYPE.
Differentiation of bovine and porcine strains of *Br. abortus* .. 158
Undulant fever due to *Brucella* of porcine type – *Br. suis* .. 708

BR. ABORTUS INFECTION, GENERAL. See also Brucella infection, general.
Pathogenesis of *Br. abortus* infection 501, 604
A study of the *Br. abortus* agglutination titres of various species of farm animals in Maryland 579

BR. ABORTUS INFECTION IN CATTLE.
General.
Contagious bovine abortion, general 15, 211, 321, 322, 323, 327, 494, 501, 604, 647
In Holland 323
In Norway 646
In Rumania 647
In Sweden 451
In Turkey 259
In Canada 155
In U.S.A. 14, 416, 603, 689
In Australia 399, 553
In Fiji 77
In Gold Coast 793
Research on contagious abortion 451, 642, 646
Ontario Research Foundation committee on contagious abortion 155
Report of committee [U.S. Livestock Sanit. Ass.] on *Br. abortus* infection 646
Relation of nutrition to contagious cattle abortion 14
Effect of *Br. abortus* infection on milk production 124
Rapid spread of *Br. abortus* infection in an accredited herd 155
Epizootiology of *Br. abortus* of cattle 321
Br. abortus infection and hygromata of cattle 322
Skin as a portal of entry for *Br. abortus* in pregnant cattle 329
Common occurrence of sterility on *Br. abortus* infected farms 418
Br. abortus infection as predisposing factor to mastitis and diseases of the new-born 418
Prophylaxis of *Br. abortus* infection with a view to reinfection 605
Infection experiments with *Br. abortus* in young bulls .. 648
Does *Br. abortus* cause a general infection in cattle? .. 648
Comparative changes caused by *Br. abortus* in bovine foetuses and guinea pigs 757
Course and diagnosis of *Br. abortus* infection 702
Control.
Control of *Br. abortus* infection in cattle 156, 321, 417, 459, 603, 604, 605, 623
Use of live vaccine and Weichlein's inoculum 321
Vaginal treatment with "concipin" 321
Regulations of Hanover Provincial Chamber of Agriculture for the voluntary eradication of abortion 211
Br. abortus infection in relation to inter-state cattle .. 417
Conditions necessary for successful eradication of bovine contagious abortion 325
Eradication of contagious abortion. A Northumbrian experiment 647
Prevention of brucella infection in Brazil 707
Control of contagious abortion in Saxony 417, 702
Control of contagious abortion in India 418
Diagnosis [general].
Bovine blood and milk and guinea pig blood serological tests for *Br. abortus* in milk 419
Comparison of methods of diagnosis of *Br. abortus* infection 646

PAGE

BR. ABORTUS INFECTION IN CATTLE [cont'd].
Diagnosis [animal inoculation].
Biological demonstration of *Br. abortus* in milk 179, 501, 690
Culture methods for *Br. abortus* infection in guinea pig tests 564
Diagnosis [agglutination test]. See also *Br. abortus* infection in cattle, milk.
Agglutination test in diagnosis of *Br. abortus* infection in cattle 325, 326
Noble's method of agglutination 97
Br. abortus agglutination titres of the various species of farm animals in U.S.A. 579
Preparation of antigen and technique for rapid agglutination test for 325
Agglutinin titres in *Br. abortus* infected herds tested at an interval of one year 564
Resuscitation of the agglutinins in sheep and cattle infected with brucella 579
Use of various agents in attempt to influence brucella agglutinin content of blood 757
The persistence of brucella agglutinins in calves of reactor cows 324
Diagnosis [complement-fixation test].
Holth's reaction in diagnosis of contagious abortion 706, 758
Diagnosis [ophthalmic test].
Ophthalmic test in contagious abortion of cattle 604
Diagnosis [skin tests].
Diagnosis of brucella infection in horses and cattle by intradermal reaction 527, 528, 579
Immunization [general].
Vaccination against bovine contagious abortion 96, 156, 328, 562
Protection against contagious abortion 501
Local immunization of cattle against contagious abortion .. 418
Vaccination against contagious abortion in Lithuania .. 418
Efficacy and safety of vaccines prepared from *Br. abortus* strains of different degrees of virulence 156
Immunization [dead vaccine].
Treatment of *Br. abortus* infection (dead vaccine) .. 501
Immunization [live vaccine].
Avirulent live vaccine against contagious abortion 501
Vaccination against contagious abortion with live vaccine 329, 606
Laboratory animals, experiments on.
Br. abortus infection in guinea pigs. Prevention and treatment with immune serum 501, 502
Milk.
Milk agglutination for the diagnosis of brucella infection of cow's udder 97, 419, 757
Biological demonstration of *Br. abortus* in milk .. 179, 501
Examination of milk from Warsaw market for *Br. abortus* 484
Increased frequency of fevers of undulant type in non-tropical countries, and relationship to infection by cow's milk 421
Incidence of *Br. abortus* in milk 124, 582
Excretion of *Br. abortus* in milk 157
Selective medium for the identification of *Br. abortus* in milk 419
Preservation of milk samples with brilliant green for *abortus* examination 538
Histology of normal and infected cows' udders (*Br. abortus*) 563
Br. abortus in raw milk, butter and ice cream .. 270, 304
Types in brucella recovered from milk in New York State 332
Treatment.
Trypan blue and *Br. abortus* infection 128
Effect of therapeutic agents on *Br. abortus* infection in guinea pigs 329
Chemotherapy of contagious abortion with "resorcin" .. 501
Udder infection. See *Br. abortus* infection in cattle, milk.
BR. ABORTUS INFECTION IN HORSES. See Brucella infection in horses.
BR. ABORTUS INFECTION IN MAN. See Brucella infection in man.
BR. ABORTUS INFECTION IN SWINE. See Brucella infection in swine.
BR. MELITENSIS.
Pathogenicity of *Br. melitensis* 501
Agglutination of *Br. melitensis* by the sera of tuberculous persons 580
BR. MELITENSIS INFECTION IN CATTLE.
Some cases of undulant fever of bovine origin, *melitensis* strain 98
Persistence of *Br. melitensis* (caprine variety) in naturally infected cows 649

PAGE

BR. MELITENSIS INFECTION IN MAN. See Brucella infection in man.
BR. MELITENSIS INFECTION IN SHEEP. See Brucella infection in sheep.
BR. SUIS. See *Br. abortus*, porcine type.
BUDGERIGARS. See Psittacosis.
BUFFALO FLY. See *Lyperosia*.
BUFFALOES. See Cassava poisoning, Catarrh, malignant bovine, *Clostridium welchii*, *Dictyocaulus*, Foot rot, *Lyperosia*, *Mycobacterium tuberculosis*, bovine type, Osteomyelitis bacillosa, *Pasteurella boviseptica* infection, Skin, diseases.
BULBAR PARALYSIS, INFECTIOUS. See Aujeszky's disease.
BULGARIA. See Catarrh, malignant bovine, Law, *Mycobacterium tuberculosis* infection in birds.
BUNOSTOMUM.
The presence of an anticoagulin in the oesophagus of *B. trigonocephalum* from the intestine of sheep 365
BURMA. See also *Bacillus anthracis* infection, Blackleg, Foot and mouth disease, general, *Pasteurella boviseptica* infection, Reports, Rinderpest, *Trypanosoma evansi*.
Diseases of livestock in Burma 190
BURSATI.
Bursati in India 400, 746
Research on bursati at Muktesar 550
Histopathological studies on cases of helminthic granuloma (bursati) of equine skin 746
"BUSH SICKNESS."
Limonite as prophylactic against "bush sickness" 445
Soil and mineral supplements in treatment of "bushsickness" 772
BUTTER. See Milk, bacterial content.
N-BUTYLIDENE CHLORIDE.
N-Butylidene chloride, new anthelmintic 275

C

CALCIUM.
Metabolism.
Determination of calcium deficiency of sheep 633
Calcium in blood of sheep and cows 630
Distribution of calcium between blood-plasma and erythrocytes 546
Investigations into the structure of cattle bone, normal and altered by feeding upon rations low in calcium 382
Significance of calcium for domesticated ruminants .. 382
Effect of a calcium deficient diet on pregnant ewes .. 264
Calcium phosphates in feeding of domestic animals .. 68
Calcium content of blood serum in fasting animals after intravenous injecton of calcium and after bleeding .. 68
Changes in calcium of serum of cows at calving and of calf during early life 768
Effect of calcium supplements on the growth of Merino sheep 131
Therapy.
Therapeutic application of calcium salts 61
Intravenous calcium therapy 490
Calcium therapy in milk fever 387, 776
CALCULI.
Pulmonary lithiasis in the sheep 670
CALIFORNIA. See U.S.A.
CALIPERS.
A tuberculin test skin caliper 681
CALVES.
General. See Lungs, Blindness.
Bacterial diseases. See *Bacterium enteritidis* infection, *Brucella abortus* infection in cattle, immunization [general], *Corynebacterium*, general, *Mycobacterium tuberculosis*, BCG strain, *Mycobact. tuberculosis* infection in cattle, general.
Diseases general. See also Diarrhoea, Haemorrhage, Pneumonia, general, Sweating sickness.
The relative frequency of various diseases among calves in Denmark 668
Fungous diseases. See Dermatitis, mycotic.
Metazoan parasites. See *Ascaris*, *Haemonchus*.
Physiology. See Blood, chemical content [minerals].
Protozoan diseases. See *Globidium*, Makebbe, *Theileria*.
Virus diseases. See Rinderpest.
CALVING. See Parturition.
CAMELS.
General. See Milk, composition.
Protozoan parasites. See Eimeria infection, general, *Trypanosoma evansi* infection, *Tryp. soudanense* infection.

PAGE

CANADA. See also *Brucella abortus* infection in cattle, Haematuria, Helminth parasites, general, *Mycobacterium tuberculosis*, BCG strain, *Mycobact. tuberculosis* infection in cattle, general, *Parametorchis*, Reports, Research institutes.
Diseases of livestock in Canada 788, 789
CANARIES. See Plasmodium infection, avian.
CANCER. See Neoplasms.
CANINE DISTEMPER. See Distemper, dog.
CANKER.
Fowl canker 437
CAPILLARIA.
C. contorta and *C. retusa* in the turkey 245
CAPONS. See Oestrum.
CAPTIVITY, ANIMALS AND BIRDS IN.
Salmonella infections in pigeons and cage birds 12
CARABAOS. See Buffaloes.
CARBOHYDRATE.
Mastitis and deficiency of carbohydrate 6
Control of mastitis by carbohydrate-rich food 766
CARBON DIOXIDE.
The effect of carbon dioxide on bacterial growth 219
Effect of carbon dioxide under pressure upon bacteria .. 336
CARBON DISULPHIDE.
Carbon disulphide against swine stomach worms 675
CARBON TETRACHLORIDE.
Treatment of parasitic gastritis in sheep and goats with carbon tetrachloride 61
Value of carbon tetrachloride 275
The toxicity, for sheep, of carbon tetrachloride 446
"CARBOZOO." See *Bacillus anthracis* infection, immunization.
CARRIERS. See also Invertebrate vectors.
Spontaneous disappearance of trypanosomes in three Europeans who were carriers of trypanosomes 27
Swine fever virus carriers 240
Rinderpest virus carriers 240
Carrier problem in a case of chronic rinderpest 615
CASEOUS LYMPHADENITIS. See *Bacterium purifaciens*, *Corynebacterium pseudotuberculosis ovis* infection.
CASSAVA POISONING.
Poisoning of buffaloes by cassava 691
CASTRATION.
Hormonal effect of various castration methods 182
Castration of hermaphrodite mammals 438
Castration of cows by elastic ligature 633
CATANIA. See Italy.
CATAPHORESIS, BACTERIAL. See Bacteria, general.
CATARRH, MALIGNANT BOVINE.
Malignant bovine catarrh 117, 175, 666
Malignant catarrhal fever in Bulgaria 667
CATS.
General. See Lymphatic system, "Pernocton."
Bacterial diseases. See Brucella infection in cats, Paratyphoid group infection, *Pasteurella pseudotuberculosis* infection.
Diseases general. See Neoplasms.
Metazoan parasites. See *Aelurostrongylus*, Cestodes, general, *Echinococcus*, Helminth parasites general, cat parasites, *Opisthorchis*, *Osleroides*, *Syngamus*, *Toxocara*.
Protozoan diseases. See Eimeria infection, feline, Endamoeba infection, Leishmania infection, *Trichomonas*, *Trypanosoma annamense*.
Virus diseases. See Aujeszky's disease, Lymphogranuloma inguinale.
CATTLE.
General. See Breeding, Castration, Dehorning of cattle, Lightning stroke, Obstetrics.
Anatomy. See Amnion, Lymphatic system, Ovary.
Bacterial diseases. See *Bacterium enteritidis* infection, *Brucella abortus* infection in cattle, *Br. melitensis* infection, *Clostridium tetani* intoxication, *Cl. welchii*, *Corynebacterium pyogenes*, Gas gangrene, Gas oedema, *Haemophilus influenzae*, *Mycobacterium paratuberculosis* infection, *Mycobact. tuberculosis* infection in cattle, *Pasteurella boviseptica* infection, Streptococcal mastitis.
Diseases general. See also Abortion, general, Acetonaemia, Alopecia, Bronchitis, infectious, Broncho-pneumonia, Catarrh, malignant bovine, Cystic mole, Diarrhoea, Endocarditis verrucosa, Endometritis, Genital system, diseases, Haematuria, Haemoglobinuria, Intestines, diseases, Keratitis, infectious, Leucaemia, Lymphadenosis, Mastitis, Metritis, Milk fever, Neoplasms, general, Ophthalmia, contagious, Osteomyelitis bacillosa, Papilloma, Paralysis, general, "Peg-leg," Sterility, Tetany, Transit fever.
Earth-borne diseases of cattle and sheep in Brandenburg and Pomerania 46
The dairyman and his afflictions 399
Fungous diseases. See *Trichophyton*
Metazoan parasites. See *Boophilus*, *Cysticercus*, *Demodex*, *Fasciola*, *Lyctocoris campestris*, Mange, Nematodes, Oestridae, *Schistosoma*, *Stephanofilaria*, Stomach worms, Strongyles, *Syngamus*, Ticks, general.
Physiology. See Blood, general, Blood, picture, Blood, sedimentation rate, Blood, serum, Bones, Foetus, Lactation, Ovary, Parturition, Pituitary, Pregnancy, Reproduction, Udder, Urine, Uterus, Vitamins, vitamin A, Vitamins, vitamin C.
Poisoning. See Acorn poisoning, Fluorine, Oak bud poisoning, Poisoning, poisonous plants, Senecio, Sewage poisoning.
Protozoan diseases. See Anaplasma infection, bovine, Babesia infection, bovine, Eimeria infection, bovine, *Globidium*, Protozoa, general, Theileria infection, Trichomonas infection, "Tristeza," Trypanosoma infecton, general, *Tryp. evansi* infection, *Tryp. vivax*.
Virus diseases. See Aujeszky's disease, Foot and mouth disease, Heartwater, Pleuro-pneumonia, bovine contagious, Rabies, Rinderpest, Vaccinia.
CATTLE PLAGUE. See Rinderpest.
CAUSTIC SODA.
Disinfection of swine fever virus with caustic soda 180
CENSUS.
Livestock census for Nyasaland 450
Livestock census for Gold Coast 75, 793
Livestock census for Northern Rhodesia 191
Livestock census for Ceylon 192, 594
Livestock census for New Zealand 294, 295
CERCARIA.
Two amphistome cercariae and their adults 38
CEREBROSPINAL FLUID.
Infection of the cerebrospinal fluid of antelopes with *Trypanosoma rhodesiense* 610, 720
CESTODES, GENERAL. See also *Coenurus*, *Cysticercus*, *Davainea*, *Diphyllobothrium*, *Echinococcus*, *Monezia*, *Raillietina*, *Taenia*.
Use of saturated magnesium chloride for faecal test on eggs of tapeworm 184
Canine and feline tapeworms with elliptical segments .. 747
"Nemural" as treatment for tapeworms in small animals .. 773
CEYLON. See also Babesia infection, general, *Bacillus anthracis* infection, general, Blackleg, *Filaria*, Foot and mouth disease, general, Mastitis, *Mycobacterium tuberculosis* infection in cattle, general, *Pasteurella boviseptica* infection, Plasmodium infection, avian, Pleuro-pneumonia, contagious caprine, Rabies, general, Reports, Rinderpest, *Trypanosoma evansi*, Zootechny.
Diseases of livestock in Ceylon 191, 593, 594
CHAMOIS. See Mange.
CHEMOTHERAPY. See Therapeutics.
CHICKENPOX. See Varicella.
CHICKENS. See Fowls.
CHICKS. See *Bacterium pullorum* infection, Encephalomalacia, Fowl paralysis, Fungi, general.
CHIMPANZEES. See *Balantidium*.
CHINA. See Helminth parasites general, cat parasites, Nematodes, general, Rinderpest.
CHINCHILLA RABBITS. See Rabbits.
CHLORAL HYDRATE.
Chloral hydrate as general anaesthetic for the fowl 543
Chloral hydrate narcosis for domestic animals 777
CHLOROPHYLL.
Conversion of chlorophyll in animal organism 135
CHOLESTEROL.
Cholesterolaemia 284
CHRYSOCOMA TENUIFOLIA.
C. Berg poisoning in Angora goats 131
CHRYSOMYIA [COCHLIOMYIA].
Cutaneous myiasis in Southern Rhodesia .. 555, 557, 741
C. americana sp. nov. in America 576
CIRCLING DISEASE OF SHEEP.
Circling disease: a meningo-encephalitis of sheep in New Zealand 295, 449, 461
CLASSIFICATION OF BACTERIA. See Bacteria, general, classification.
CLIMATIC BUBO. See Lymphogranuloma inguinale.

PAGE

CLIMATIC FACTORS.
Climatic factors influencing density of tsetse flies 659
CLOSTRIDIUM. See also Anaerobes, general, Blackleg, Braxy, Gas gangrene, Lamb dysentery, Osteomyelitis bacillosa.
Anaerobic bacteria in soil 710
Anaerobic bacilli and infections caused by them in domestic animals in the Dutch East Indies 215, 216, 503
CL. BOTULINUM. See also Bacteria general, toxins.
Cultivation of *Cl. botulinum* 99
Behaviour of *Cl. botulinum* in frozen fruits and in vegetables 215
Effects of freezing on spores and toxin of *Cl. botulinum* .. 215
CL. BOTULINUM INTOXICATION. See also Bacteria, general, toxins.
Botulism 710
Botulism in horses 215
Botulism in swans 649
Forage poisoning as noted by Leonard Pearson and subsequent developments 623
CL. CHAUVOEI. See also Blackleg.
Practical value of heat-stable antigen of *Cl. chauvoei* as an immunizing agent 213
Studies on *Cl. chauvoei*. Passive protection with pure "O" sera 213
Differentiation of *Cl. chauvoei* and *Cl. septique* by haemolysis reaction 785
CL. GIGAS.
Comparison between *Cl. gigas* Zeissler and Rassfeld and organism isolated from cases of osteomyelitis bacillosa .. 216
Pathogenicity of *Cl. gigas* Zeissler and Rassfeld, 1929 in Dutch East Indies 503
CL. OEDEMATIENS.
Infection with Novy's bacillus of malignant oedema (*Cl. oedematiens*) in a swan 99
Black disease in New South Wales 553
CL. OVITOXICUM.
Active immunization of sheep against infectious entero-toxaemia with *Cl. ovitoxicum* anaculture 213
Identification of *Cl. ovitoxicum* type of toxin from the intestine of sheep in Great Britain 333
Relationship of *Cl. ovitoxicum* to *Cl. welchii* group 650
CL. PALUDIS INFECTION.
Examination of single-cell cultures of *Cl. paludis* 422
CL. PARABOTULINUM.
Botulism of sheep caused by *Cl. parabotulinum* in Western Australia and its association with sarcophagia 607
Antigenic substances of *Cl. parabotulinum* 649
CL. PERFRINGENS. See *Cl. welchii*.
CL. SEPTIQUE.
Differentiation of *Cl. chauvoei* and *Cl. septique* by the haemolysis reaction 785
CL. SPOROGENES.
A vitamin necessary for the growth of *Cl. sporogenes* .. 17
CL. TETANI INFECTION. See also Bacteria general, toxins.
Naturally acquired antitetanic immunity in the bovine, ovine and caprine species 114, 372
Pathology and serotherapy of tetanus in the horse 503
Bacelli's treatment of tetanus 386
CL. WELCHII.
Cl. welchii in intestinal contents of cattle and buffaloes .. 216
Gas oedema in cattle caused by *Cl. welchii* 216
Examination of single-cell cultures of *Cl. welchii* 422
Variation in *Cl. welchii* 422
Rapid method for identification of *Cl. welchii*. 422
Strain of *Cl. welchii* producing fatal dysentery in lambs .. 422
Multiple toxins produced by some organisms of *Cl. welchii* group 422
Cl. welchii in intestine of healthy sheep and goats in Dutch East Indies 503
Relationship of *Cl. ovitoxicum* to *Cl. welchii* group 650
Bovine haemoglobinuria associated with *Cl. welchii* 651
CLOVER.
Poisoning of horses by *Trifolium hybridium, Lupinus luteus* and *Vicia sativa, villosa, cracca* 779
Cause of sweet clover (Melilotus) disease 118
Determination of hydrocyanic acid in white clover 627
"COAST DISEASE."
Investigation of "coast disease" 265
COCCIDIOSIS. See Eimera infection.
COCCIDIUM. See *Eimerea, Isospora*.
COCHIN-CHINA. See *Mycobacterium tuberculosis* infection in cattle, general.
COCHLIOMYIA. See *Chrysomyia*.
COENURUS.
Cerebral coenurosis in Eritrea 479

PAGE

COLITIS.
Bacterium aertrycke in colitis of foals 709
COLLEGES.
Work of the Instructional Farm of the Hanover Veterinary College at Adendorf 787
Veterinary Faculty of Zagreb University 787
COLLODION MEMBRANES. See Filtration.
COLOMBIA. See Babesia infection, bovine, Helminth parasites general, general.
COLORIMETER.
A new colorimeter 489
COLPIDIUM.
An attempt to grow tubercle bacilli within single-celled organism *C. campylum* 89
COMMITTEES. (Amer. Vet. Med. Ass.).
Report of committee on transmissible diseases of swine .. 259
Report of the special committee on poultry diseases 260
Report of committee on transmissible diseases of poultry .. 436
COMMITTEES. (U.S. Livestock Sanit. Ass.).
Report of committee on miscellaneous transmissible diseases 665
Report of committee on Bang's disease 646
Report of committee on transmissible diseases of swine .. 765
Report of committee on tick eradication 659
COMMITTEES. (Other).
Dutch committee on brucellosis 322, 323, 604
COMMON COLD.
Streptococci isolated from throats of humans, from raw milk, flies and water during epidemics of the common cold 407
COMPLEMENT-FIXATION TEST. See Tests, serological [complement-fixation].
"CONCIPIN."
Vaginal treatment with "concipin" in control of contagious abortion 321
CONFERENCES.
Report on brucellosis presented at end of conference held by veterinary services at Avignon, November 25th-26th, 1932 420
France. Conference of veterinary services on brucella infection 649
Conference on co-ordination of veterinary research in East Africa 683
CONGRESSES.
First International Congress of Mediterranean Hygiene, held at Marseilles, Sept. 20th to 25th, 1932 194
CONJUNCTIVA.
Anthrax infection *via* conjunctiva 696
CONURES. See Psittacosis.
COPPER SULPHATE.
Copper sulphate poisoning in sheep 446
Copper sulphate against sheep stomach worm 676
CORN COCKLE.
Corn cockle poisoning of fowls 181
CORPUSCLES, BLOOD. See Blood, corpuscles.
CORYNEBACTERIUM, GENERAL.
Corynebacteria in milk from clinically normal cow udders .. 93
Non-pathogenic diphtheria in a calf 94
Behaviour of diphtheria and pseudo-diphtheria bacteria towards a differential staining method 293
C. PSEUDOTUBERCULOSIS OVIS INFECTION [CASEOUS LYMPHADENITIS].
Control of caseous lymphadenitis in sheep 95, 414
Caseous lymphadenitis in sheep in New Zealand .. 295, 449
Caseous lymphadenitis in sheep in India 551
Caseous lymphadenitis in sheep 206, 316, 414
Infection experiments in caseous lymphadenitis 206
Experimental and natural infections of the sheep with the Preisz-Nocard bacillus 498
C. PYOGENES INFECTION.
Some properties of *C. pyogenes* 644
Cause of *C. pyogenes* infection in India 401
C. pyogenes infection in calves 94, 207
Metritis and vaginitis of cows caused by *C. pyogenes* .. 457
C. pyogenes infection in foals 457
C. pyogenes infection in sheep and pigs 561
Blood picture of pigs affected with pyobacillosis 428
Mastoiditis and brain abscesses in swine caused by *C. pyogenes* 599
Rapid isolation of *C. pyogenes* of swine on solid medium .. 644
C. RENALIS.
Studies on *C. renalis* 457
COUGH, HOPPEGARTEN.
Streptococ iisolated from cases of Hoppegarten cough .. 453
COUNCILS.
History of the National Research Council (U.S.A.) 1919-1933. Division of medical sciences 491
16th annual report of the National Research Council (Canada) 788

PAGE

COWPOX. See Vaccinia.
COWS. See Cattle.
"CRIPPLES" IN LAMBS.
"Cripples" in lambs 535
CRYOSCOPY.
Freezing-point of pasteurized and sterilized milks 583
Comparative notes on the cryoscopy of milk 583
CRYPTORCHIDISM.
Cryptorchidism in pigs 126
CULICOIDES.
Onchocerca cervicalis and its development in *C. nubeculosis* Mg. 472
CULTURE MEDIA. See Media.
CYANIDE POISONING.
Poisoning of animals by cyanides present in some industrial effluents 272
Cyanide poisoning 272
CYPRUS. See Abortion, general.
CYSTIC MOLE.
Cystic mole in cattle 669
CYSTICERCUS.
C. ovis in oesophagus of sheep 245
Rapid method of evaginating scolices in parasitic cysts .. 362
Bovine cardiac cysticercosis 363
Cysticerci in cattle and pigs in East Africa 685
Ovine cysticercosis in France 363
C. inermis in cattle in Holland 39
C. bovis infestation in Tanganyika Territory 296
Bovine cysticercosis in Tunis 168
CYSTINE.
Cystine content of bushes and grasses in a Karroid Area (Fauresmith) 289
CYTOLOGY.
Cytological technique 452
CZECHOSLOVAKIA. See *Bacillus anthracis* infection, immunization, Encephalomyelitis, equine, *Mycobacterium tuberculosis* infection in cattle, Rabies, general, Swine fever, immunization.

D

"DARMOUS." See also Fluorine.
Aetiology and pathogenesis of "darmous" 130
Research on "darmous" in Morocco 193
DAVAINEA PROGLOTTINA.
The common small tapeworm of poultry, *D. proglottina* .. 250
D. proglottina and its control 362
D. proglottina and disease in fowls 523
DEER. See Anaplasma infection, *Bacillus anthracis* infection, Eimeria infection, general, Oestridae, Pasteurella infection, Pneumonia, *Trypanosoma evansi* infection.
DEFICIENCY DISEASES. See Black tongue, "Bush sickness," Calcium, Leg weakness, Milk fever, Minerals, deficiency, Minerals, metabolism, "Peg-leg," Phosphorus, Rickets, Tetany, Vitamins.
DEGENERATION. See Amyloid degeneration.
DEGLUTITION.
Physiology of deglutition 678
DEGUELIA. See Derris.
DEHORNING OF CATTLE.
Nerve blocking in dehorning of cattle 447
DEMODEX.
D. caprae in goats 379
Demodectic mange in goats in Nigeria 74, 141
Demodectic mange of cattle in Nigeria 74
DENMARK. See Aujeszky's disease, *Bacillus anthracis* infection, general, *Bacterium pullorum* infection, general, Calves, *Habronema*, Law, Milk, general, *Mycobacterium tuberculosis* infection general, control, *Mycobact. tuberculosis* infection in cattle, control, *Mycobact. tuberculosis* infection in man, general, Oestridae, Serum institutes.
DENTAL CARIES.
Aetiology of dental caries 49
DERMACENTOR.
Development of *Babesia canis* in *D. reticulatus* 423
D. albipictus Packard on the moose 479
D. variabilis as a host of *Pasteurella tularensis* 618
Transmission of anaplasmosis by *D. variabilis*, *D. andersoni* 101, 244, 245
DERMANYSSUS.
Effect of *D. gallinae* on skin of man 662
DERMATITIS. See Skin, diseases.
DERMATITIS, MYCOTIC.
Mycotic dermatitis of sheep in Fiji 77
Mycotic dermatitis in the calf 505

PAGE

DERMATITIS, PUSTULAR.
Anti-staphylococcic vaccine in treatment and prevention of pustular dermatitis of mammary gland in sheep and goats 145
Contagious pustular dermatitis 518
Virus of contagious pustular dermatitis 733
DERMATOBIA HOMINIS. See Oestridae.
"DERRENGADERA." See Trypanosoma infection general, general.
DERRIS.
Use of derris powder in warble fly control .. 542, 738, 739
DIARRHOEA.
Irradiated ergosterol in treatment of diarrhoea of young animals 276
DIARRHOEA, BACILLARY WHITE. See *Bacterium pullorum* infection.
DIARRHOEA, CALF.
Control of coliform calf diarrhoea 378
DIARRHOEA, INFECTIOUS BOVINE.
Infectious diarrhoea of cattle 378, 667
DIASTASE.
Resistance of diastases to high pressures 72
DICTYOCAULUS.
Bionomics of *D. filaria* 251
D. viviparus in the buffalo 387
"Triformol-glycerine-allylique" in treatment of parasitic bronchitis in cattle 773
DIET. See Nutrition.
DIOCTOPHYME.
D. renale in kidney of dog 113
DIPHTHEROID BACTERIA. See *Corynebacterium*.
DIPHYLLOBOTHRIUM.
Life history of *D. latum* (Linn.) 110
The pig and dog as carriers of *D. latum* 747
DIPS.
Sheep ked and eradication by dipping 431
Influence of regular dipping on Merino sheep and fleece .. 676
DIPTERA. See also *Bdellolarynx uniseriatus*, Blowflies, *Culicoides*, *Glossina*, *Lyperosia*, Mosquitoes, *Phlebotomus*, *Simulium*, Tabanids.
Studies on the higher diptera of medical and veterinary importance 37
DIROFILARIA.
"Fouadin" in treatment of *D. immitis* in dog 127, 245, 675
DISEASES, GENERAL, UNSPECIFIED. See also Calves, diseases general, Cats, diseases general, Cattle, diseases general, Dogs, diseases general, Game, diseases, Horses, diseases general, Lambs, Sheep, diseases general and under name of organs of body.
A standard classified nomenclature of disease 637
Human disease in animals 46
Is powdered glass "poisonous" to animals? 262
Importance of nutrition in diseases of livestock 121
Infectious diseases and brain 665
Prophylaxis of infectious and parasitic diseases of domestic animals of Brazil 404
Law on prevention of animal diseases in Bulgaria 786
Infectious animal diseases in Europe in 1932 374
Incidence of animal diseases in Germany in 1932 794
Regulations governing epizootic diseases in Spain 549
Control of contagious diseases of animals in Turkey .. 258
Report of committee (U. S. Livestock Sanit. Ass.) on miscellaneous transmissible diseases 665
DISINFECTANTS. See also Caustic soda, "Metaphen," Nitric acid, Phenol, Phenyl-mercuric compounds, Sodium hydroxide, Trosilin.
Use of pressure steam disinfector for disinfection, by dry heat and/or gaseous disinfectants 398
Disinfection of anthrax hides 6
Disinfectants for foot and mouth disease 277, 541
Control of poultry coccidiosis by chemical treatment of litter 386
Disinfection of avian faecal material 786
Disinfection trials of haemorrhagic septicaemia infected cattle trucks 487
Disinfection test of railway wagons with caustic soda, cresol-sulphuric acid and sulpholiquid using paratyphoid, swine erysipelas and strangles bacteria 487
DISTEMPER, GENERAL.
Distemper of carnivores. Present status of distemper research 350
Distemper in foxes 48
DISTEMPER, DOG.
General.
Canine distemper. High antigenic value of the virus after photodynamic inactivation by methylene blue 237
Canine distemper in Fiji 77

PAGE

DISTEMPER, DOG [cont'd].
General [contd].
Distemper virus non-pathogenic for pariah dogs in India.. 400
Bacterium aertryckе found in dogs with distemper .. 709
Vaccination.
Vaccination against dog distemper .. 35, 107, 233, 350, 730
DISTOL.
Treatment of fascioliasis with distol 128
DISTOMATOSIS. See *Fasciola.*
"DN 12."
"Dn 12," a new organic antimony derivative in human trypanosomiasis 443
DOGS.
General. See also Anaesthesia, Anthelmintics, "Pernocton."
Keeping a dog. Training and care in health and sickness 144
Hutchinson's popular and dog encyclopaedia 558
Bacterial diseases. See *Bacillus anthracis* infection, immunization, Brucella infection in dogs, *Mycobacterium tuberculosis* infection in dogs, Paratyphoid group infection, *Spirillum, Staphylococcus.*
Diseases general. See Black tongue, Neoplasms, Polypus, Vomiting.
Fungous diseases. See *Actinomyces.*
Metazoan parasites. See *Ancylostoma,* Cestodes, general, *Dermacentor, Dioctophyme, Diphyllobothrium, Dirofilaria,* Helminth parasites general, dog parasites, Mites, *Parametorchis,* Parasiticides, *Taenia, Thelazia, Trichinella.*
Physiology. See Blood picture, Gastric juice, Oestrum, Thyroid gland.
Protozoan diseases. See Eimeria infection, canine, *Isospora,* Leishmania infection, canine, Leptospira infection, Trichomonas infection, Trypanosoma infection general, treatment, *Tryp. brucei.*
Virus diseases. See Distemper, dog, Rabies, Typhus.
DONKEYS. See *Trypanosoma equiperdum* infection, treatment.
DOPING.
Doping of horses 131
DOURINE. See *Trypanosoma equiperdum* infection.
DROMEDARIES. See Eimeria infection, general, *Onchocerca.*
"DRY COAT" IN HORSES.
"Dry coat" in horses in Malaya 789
DUCKS. See Eggs, *Leucocytozoon anatis* infection, *Prosthogonimus pellucidus, Schistosoma, Streptovitella.*
DUTCH EAST INDIES. See Arthropoda, general, *Clostridium,* general, *Cl. gigas, Cl. welchii,* Helminth parasites, general, bird parasites, Osteomyelitis bacillosa, *Pasteurella bovisеptica* infection, Protozoa, general, Reports, *Trichinella spiralis, Trypanosoma theileri.*
DYES. See also Staining.
Dyes in treatment of mastitis 57
Lethal effect of light and dyes on vaccine virus 658
DYSENTERY, LAMB. See Lamb dysentery.

E

EAR.
Foot and mouth disease lesions in ear of guinea pigs.. .. 344
EAST AFRICA. See also Anaplasma infection, bovine, Babesia infection, general, Blue tongue, *Cysticercus,* East African swine fever, Foot and mouth disease, general, Heartwater, Horse-sickness, control, Nairobi sheep disease, Pleuro-pneumonia, contagious bovine, control, Poultry, general, Rabies, control, Reports, Research, Rift valley fever, Rinderpest, *Theileria parva* infection.
Diseases of livestock in East Africa 684, 685
EAST AFRICAN SWINE FEVER.
East African swine fever 144, 465
EAST COAST FEVER. See *Theileria parva* infection.
EAST INDIAN ARCHIPELAGO. See Ticks, general.
EBERTHELLA. See *Bacterium.*
ECHINOCOCCUS.
Echinococcus in Palestine 363
Hydatid disease in New Zealand 747
The *Echinococcus* in Europe 747
Echinococcosis 39
Diagnosis of hydatid disease 111
Role of cat in dissemination of echinococcosis 747
ECONOMIC MAMMALOGY.
Economic mammalogy 80
ECTHYMA, CONTAGIOUS.
Vaccination against contagious ecthyma of sheep 518
ECTOPARASITES, GENERAL. See Parasitic infestation.
ECTROMELIA, INFECTIOUS.
Infectious ectromelia in mice 430

PAGE

EGGS, DUCK.
Food poisoning associated with ducks' eggs 485
EGGS, HELMINTH. See under name of worm.
EGGS, HEN.
Bacteria in eggs 126
Tubercle bacilli in eggs 152
Isolation of *Bacterium sanguinarium* from eggs 210
Bact. pullorum in eggs 601
Watery whites of eggs 788
EGYPT. See Fowl plague, Newcastle disease.
EIMERIA.
Viability of *E. tenella* in soil 338
Viability of coccidial oocysts 564
Lysis of coccidial oocysts 714
Classification of Eimeriidea 508
Biothermic method of destroying oocysts of coccidia .. 564
EIMERIA INFECTION.
General.
Coccidiosis of domestic animals in Transcaucasia 337
Cross-immunity and correlation of oocyst production during immunization between *E. miyairii* and *E. separata* in rat 338
Role of insusceptible species in propagation of coccidiosis 508
Coccidiosis of rabbit and guinea pig and treatment with milk derivatives 565
Avian.
Coccidiosis 437
New avian coccidia from Uganda 508
Fowl coccidiosis in Eritrea 479
Is fowl coccidiosis caused by one or many species of *Eimeria?* 337
Coccidiosis of domestic goose 425
Immunity to coccidiosis in chickens produced by inoculation through ration 21
Control of poultry coccidiosis by chemical treatment of litter 386
Medicinal treatment of fowl coccidiosis 161
Coccidiosis of poultry in Russia. Kidney coccidiosis of geese 21
Sour milk in avian coccidiosis 386, 690
Avian coccidiosis in Russia 337
The coccidium of the owl 21
Coccidia of peacocks 161
Bovine
A study of bovine coccidiosis 424
Camels.
Coccidiosis in the dromedary 565
Coccidiosis of the camel 714
Canine.
Coccidiosis of dogs 424, 714
Feline.
Coccidia of Felidae 337
Coccidiosis of cats in Transcaucasia 424
Coccidiosis of cats 339, 714
Hares and rabbits.
Coccidiosis in hares in England 338
Coccidiosis in hares and rabbits 48
Chemical treatment of litter as an aid in the control of rabbit coccidiosis 564
E. exigua n.sp. a new coccidium of rabbit 714
Ophidian.
New ophidian coccidia from Uganda 508
Wild animals.
Coccidia of wild animals 424
Coccidia and coccidiosis of game 638
Cross-infection experiments with coccidia of rodents and domesticated animals 508
Coccidial infections in the badger *Meles taxus* 21
Coccidia of fox in Transcaucasia 222
Coccidiosis in raccoons: *E. nuttalli* n.sp., parasite of *Procyonlotor* 21
Coccidiosis of skunks 21
Coccidiosis of deer 21
A coccidium of the mongoose 338
ELECTRIC CHARGE. See Electrophoresis.
ELECTRIC STUNNING. See Slaughter.
ELECTROLYTES. See Bacteria, general.
ELECTROPHORESIS.
Electrophoresis research on spirochaetes. Electric charge and acid agglutination 30
Electric charge of rinderpest virus 571
ELEMENTARY BODIES.
Method of demonstrating virus elementary bodies 738

PAGE

ELEPHANTS. See *Syngamus*.
ENCEPHALITIS. See also Circling disease of sheep, "Louping ill".
Epizootic fox encephalitis 349
ENCEPHALOMALACIA.
Nutritional encephalomalacia in chicks 534
ENCEPHALOMYELITIS, EQUINE.
Equine encephalomyelitis 351, 616
Equine encephalomyelitis immunization 616
Respiratory infection in 351
Animals susceptible to 351, 688
Immunological relationship of eastern and western strains of virus 427, 654
Relationship of viruses of vesicular stomatitis and of equine encephalomyelitis 352, 616
Encephalomyelitis in horses in Czechoslovakia 655
Equine enzootic encephalitis in France 618
Contagious equine encephalomyelitis in Jugoslavia 654
Equine encephalomyelitis in Kansas 654
Equine encephalomyelitis in Eastern States, U.S.A. in 1933 .. 427
Mosquitoes as vectors of 107
ENCEPHALOMYELITIS, PORCINE.
Encephalomyelitis enzootica suum (Teschin sickness) 466, 467
ENDAMOEBA HISTOLYTICA.
Pathogenicity of *E. histolytica* for kittens 228
ENDOCARDITIS VERRUCOSA.
Endocarditis verrucosa in cattle 261
ENDOCRINE GLANDS. See also Adrenal gland, Pituitary, Thymus gland, Thyroid gland.
Sterility in relation to endocrine deficiency 376
New light on endocrinology 403
Endocrine syndromes 403
Placenta as organ of internal secretion 631
Grafting.
Review on gland grafting 781
Hormones. See also Sex hormones and under name of gland.
Hormones and their chemical relations 679
Therapy.
Endocrine opotherapy 496
ENDOMETRITIS.
Diagnosis of catarrhal endometritis in cattle 623
ENDOSCOPY.
Endoscopy of diseased guttural pouch of horses 448
ENDOTHELIOMA.
Lymphomatosis, myelomatosis and endothelioma of chickens caused by filtrable agent 380
ENTERITIS. See also *Bacterium enteritidis*.
Swine fever and enteritis in young pigs 515
Apparent cause of an infectious enteritis of very young lambs (colon bacilli) 600
ENTEROCOCCUS. See *Streptococcus*.
ENTERO-HEPATITIS OF TURKEYS. See *Histomonas meleagris* infection.
ENTERO-TOXAEMIA OF SHEEP. See also Pulpy kidney disease.
Active immunization of sheep against infectious entero-toxaemia (Braxy-like disease) by means of *Clostridium ovitoxicum* anaculture 213
"Struck." Entero-toxaemia of sheep caused by *Cl. paludis* 214, 451
ENTOMOLOGY, GENERAL. See also Arthropoda, general, *Demodex*, Diptera, Hemiptera, Hymenopterous parasites, Keds, Lice, Mange, Mites, *Musca*, Oestridae, *Stomoxys*, Ticks, general, *Triatoma*.
Ticks and insects of Belgian Congo 37
Acceleration of development of insects by parasitism 37
Effect of climatic conditions upon populations of insects .. 72
Arachnida. Systematic biology 80
Nyasaland Protectorate. Medical entomologist's report for 1931 449
Experimental transmission of virus of "eruptive fever" and "typhus", by blood-sucking insects 470
Parasitic mites and insects of domestic animals in Jugoslavia 742
Veterinary helminthology and entomology 795
"ENTOZON."
Treatment of metritis and mastitis of cows with "entozon" 129
Corrosive action of "entozon" on metals 541
ENUMERATION OF BACTERIA. See Bacteria general, technique [counts].
ENZYMES. See also Diastase, Thrombase.
Differentiation between Gram-positive and Gram-negative micro-organisms by enzymes 650
EOSINOPHILIA.
Investigations on eosinophilia in swine trichinosis .. 252, 253
Local eosinophilia of intestinal wall in experimental swine fever 346
EPIDEMIOLOGY.
Experimental study of epidemiology in mice 529
EPITHELIOMA CONTAGIOSUM. See Fowl pox.
EQUINE INFECTIOUS ANAEMIA. See Anaemia, equine infectious.
EQUINE PERNICIOUS ANAEMIA. See Anaemia, equine infectious.
ERGOSTEROL, IRRADIATED.
Irradiated ergosterol in treatment of septicaemia in new-born and diarrhoea of young animals 276
ERGOTAMINE.
Influence of ergotamine on blood-sugar picture in myoglobinuria paralytica 445
ERITREA. See *Coenurus*, Eimeria infection, avian, Foot and mouth disease, *Pasteurella aviseptica*, *Spirillum*.
ERUPTIVE FEVER. See Typhus.
ERYSIPELOTHRIX RHUSIOPATHIAE.
Viability of *E. rhusiopathiae* in culture 690
Action of bile on swine erysipelas bacillus 316
Disinfection test of railway wagons with caustic soda, cresol-sulphuric acid and sulpholiquid using swine erysipelas bacteria 487
E. RHUSIOPATHIAE INFECTION.
In horses.
E. rhusiopathiae in bone marrow of horse 207
In man
E. rhusiopathiae infection in man 154, 207, 316
Diagnosis by an intradermal reaction of human infection with swine erysipelas bacillus of ovine origin 316
Erysipeloid occurring among workers in a bone button factory 701
In sheep.
E. rhusiopathiae in arthritis of sheep 95
E. rhusiopathiae infection in lambs 120, 207, 458
In swine. [Swine erysipelas].
Swine erysipelas 11
Clinical forms of swine erysipelas 95
Experimental swine erysipelas in guinea pig 499
Swine erysipelas in Europe 375
Swine erysipelas in Sweden 451
Swine erysipelas in U.S.A. 259, 765
Experimental transmission of swine erysipelas 499
Agglutination test for swine erysipelas 688
New instrument for swine erysipelas immunization .. 786
ERYTHROCYTES. See Blood corpuscles [red].
ESCHERICHIA. See *Bacterium*.
ESTONIA. See Breeding.
ETHER.
Two new forms of ether anaesthesia apparatus 542
EUPATORIUM URTICAEFOLIUM.
Trembles (or milk sickness). *E. urticaefolium* poisoning in cattle 778
EUROPE. See also *Bacillus anthracis* infection, general, Blackleg, *Echinococcus*, *Erysipelothrix rhusiopathiae* infection, general, Foot and mouth disease, *Mycobacterium tuberculosis* infection general, general, Pasteurella infection, general, *Pfeifferella mallei*, Pleuro-pneumonia, contagious bovine, Rabies, Sheep pox, Swine fever, *Trypanosoma equiperdum*.
Infectious animal diseases in Europe in 1932 374
Control of livestock infectious diseases in Europe 478
"EVIPAN."
Anaesthesia by "evipan" in veterinary medicine .. 542, 543
EWES. See Sheep.
EXOTUBERCULIN. See *Mycobacterium tuberculosis*, exo-tuberculin.
EYES. See also Blindness, Keratitis, infectious, Ophthalmia, contagious.
Foreign substances injected into vitreous humour of rabbit. Pathway of transportation from one eye to its fellow .. 64

F

FAECES.
Coliform organisms in milk and bovine faeces 270
FASCIOLA.
Life history of *F. gigantica* 551
Control of liver fluke in maritime districts 169
Treatment with distol of fascioliasis in sheep 128
F. gigantica of cattle in India 400
Fascioliasis in Oldenburg 434
Campaign against liver flukes in California 744
Prophylaxis of fascoliasis in sheep and cattle 744
Distomatosis in man due to *F. hepatica* 744

PAGE

FAT NECROSIS.
Fat necrosis 439
FATIGUE.
Influence of muscular fatigue factor on aetiopathogenesis of "pitirosi" 380
FAVUS.
Peculiar fungoid infection in skin of goats and sheep (favus) 504
FEDERATED MALAY STATES. See also "Dry coat" in horses, Nematodes, general, Rabies, general, Reports, Rinderpest, control.
Diseases of livestock in the F.M.S. 789
FEEDING. See Nutrition.
FERMENTS. See Enzymes.
FERRETS. See Genital system.
FERTILITY. See also Breeding.
Measuring fertility in ram 631
FIEVRE BOUTONNEUSE. See Marseilles endemic typhus.
FIJI. See also *Brucella abortus* infection in cattle, general, Distemper, dog, general, Fowl pox, *Haemaphysalis*, Lantana, Mastitis, general, *Mycobacterium tuberculosis* infection in cattle, general, Paralysis, general, Reports, Skin, diseases.
Diseases of livestock in Fiji 77
FILARIA.
"Fouadin" in the treatment of filariasis in dog 127
Canine filariasis in Ceylon 593
FILARIOIDEA.
Filarioidea 113
FILTRABLE STAGE OF BACTERIA. See Bacteria general, filtrable stage.
FILTRABLE VIRUSES. See Viruses.
FILTRATION.
Ultrafiltration in bacteriology 549
Collodion membrane filters 549
Filtration of viruses of Borna disease and Rift Valley fever through graded collodion membranes 348
Size of virus of fowl plague estimated by ultrafiltration .. 519
Effect of ultrafiltration on reactions of leishmania sera .. 723
FINLAND. See *Mycobacterium tuberculosis* infection in swine, Nematodes, general.
FISTULOUS WITHERS.
Occurrence of *Onchocerca cervicalis* in fistulous withers and poll evil 472
FLAGELLATES. See Protozoa, general.
FLEECE. See Wool.
FLOCCULATION TEST. See Tests, serological [flocculation].
FLUKES, GENERAL. See Trematodes.
FLUORINE. See also "Darmous."
Distribution of a reducing substance (vitamin C) in tissues of fluorine-fed cows 587
Effect of fluorine on the nutrition of swine 389
Fluorine and its physiological effects 389
Spontaneous fluorosis in Morocco 130
Changes in the teeth of white rats due to chronic fluorosis .. 181
Fluorosis in sheep in Iceland after volcanic eruptions .. 779
Histology of bones of sheep suffering from fluorine poisoning 779
Fluorine poisoning in sheep and cattle from aluminium factories 779
FLY TRAPS.
Sheep blowfly traps 521, 619
Traps for tsetse flies 359, 490
FLYING FOXES.
Disease of flying foxes in Fiji 77
"FLYSTRUCK." See Blowflies.
FOALS. See Anthelmintics, Colitis, New-born, diseases of, "Witch's milk".
FOETUS. See also *Brucella abortus* infection in cattle, general, *Corynebacterium pyogenes*, New-born, diseases of.
Germ contents of foetal fluids and of foetuses of healthy horses and cattle 161
FOOD HYGIENE. See also *Trichinella*.
Microbiology of frozen foods 215
Influence of foodstuffs upon human tubercle bacilli 412
Toxicology of plants in South Africa together with consideration of poisonous foodstuffs and fungi 595
Typhoid-paratyphoid bacteria in dust of railway wagons used for meat 461
Meat inspection. See also *Trichinella*.
Meat inspection 403, 595, 636
Bacteriological meat inspection 271, 771
Slaughter and inspection of animals for food 383
Meat and milk inspection in various countries 178
French laws relating to meat inspection 486
Meat preservation 383

PAGE

Length of time blood of slaughtered animals will remain fit for use 55
Bacterial flora developing on stored lean meat 384
Meat exportation and possible influence upon it of foot and mouth disease 430
FOOD POISONING. See also Paratyphoid group.
Food poisoning 771
Incidence of bacteria in eggs 126
Food poisoning associated with ducks' eggs 485
Is Salmonella food poisoning caused by living bacilli or by thermostable toxic products? 415
Food poisoning in Aberdeen due to organisms of salmonella group 320
Food poisoning due to staphylococci 385
Prevention of meat poisoning in human beings 384
FOOT AND MOUTH DISEASE.
General.
Foot and mouth disease in Europe 374
Foot and mouth disease in Great Britain in 1932 188
Foot and mouth disease in Germany 795
Foot and mouth disease in Holland 794
Foot and mouth disease in Sweden 451
Foot and mouth disease on Côte d'Or 344
Foot and mouth disease in Kenya 143, 492
Foot and mouth disease in Nigeria 139
Foot and mouth disease in Tanganyika Territory 296
Foot and mouth disease in South Africa 589
Foot and mouth disease in Southern Rhodesia .. 555, 686
Foot and mouth disease in the Sudan 590
Foot and mouth disease in Burma in 1932 190
Foot and mouth disease in Ceylon 191, 593
Control of foot and mouth disease in Philippines 343
Foot and mouth disease in Turkey 259
Foot and mouth disease in U.S.A. 689
Mutual immunity between cow pox and foot and mouth disease 572
Foot and mouth disease lesions in ear epidermis of inoculated guinea pigs 344
Control.
Meat exportation and possible influence upon it of foot and mouth disease 430
Control of foot and mouth disease in East Africa 684
Immunization.
Duration of immunity after vaccination 512, 653
Causes of accidents after vaccination .. 512, 513, 654
Vaccination by chloroform-virus 513
Vaccination by virus and serum 512, 513
Vaccination by glycerinated blood in Southern Rhodesia .. 233
Immunization by convalescent blood 429
Immunization by antiserum 478
Tests of Professor Lignières' method of immunization 430, 513
Virus.
Disinfectants for foot and mouth disease virus .. 277, 541
Survival of foot and mouth disease virus in the musculature of guinea pigs 344
Absence of pathogenic power for man in known types of foot and mouth virus 429
FOOT ROT.
Foot rot of sheep 176
Foot rot in New Zealand 449
Foot rot in carabaos 377
FORAGE POISONING. See *Clostridium botulinum* intoxication.
FORMALDEHYDE.
Alopecia in ox caused by formaldehyde 678
FORMALIN. See Formaldehyde.
FORMOL. See Formaldehyde.
FORTNER'S METHOD. See Bacteria general, technique [general].
"FOUADIN."
"Fouadin" in treatment for *Dirofilari aimmitis* in dog 127, 245, 675
FOURNEAU 309.
Treatment of experimental infection of the dog by *Trypanosoma brucei* with Fourneau 309 26
Preventive action of Fourneau 309 in experimental infection of cats by *Tryp. annamense* 225
FOWL CHOLERA. See *Pasteurella aviseptica* infection.
FOWL LEUCAEMIA. See Leucaemia.
FOWL LEUCOSIS. See Leucosis, fowl.
FOWL PARALYSIS.
Fowl paralysis 624
Fowl paralysis in Kenya 493
Fowl paralysis in young chicks 262
Blood studies of fowls with 380, 532, 533

PAGE

FOWL PARALYSIS [cont'd].
Heredity in 533
Histopathology and diagnosis of 533
Aetiology of 690
So-called range paralysis of chicken 439
FOWL PLAGUE.
Fowl plague in a sparrow 48
Pathology of fowl plague 519
Fowl plague in Egypt 574
Fowl plague in Turkey 259
Cultivation of fowl plague virus in cell-free media 519
Cultivation of fowl plague virus in tissue culture .. 238, 735
Size of the virus of fowl plague 519
Differentiation of fowl plague and Newcastle disease .. 574
Necrosis in fowl plague encephalitis 355
Cross-immunity test with Korea fowl disease and Japanese fowl plague and a comparison with Newcastle disease .. 519
Fowl plague described by Farinas, compared with a similar disease in Korea 518
Non-specific immunity of white rats to fowl plague virus .. 519
Infection of mice with fowl plague virus 736
Vaccination against 735
FOWL POX.
Fowl pox 437
Histology of fowl pox 734
Outbreak of fowl pox following vaccination 105
Fowl pox in two pheasants and a partridge 48
Histochemical study by microincineration of inclusion body of fowl pox 35
Inclusion bodies in fowl pox 734
Fowl pox in Fiji 77
Fowl pox in Turkey 259
Vaccination against fowl pox in Holland 239
Vaccination against 356, 690, 734
FOWL TYPHOID. See *Bacterium sanguinarium* infection.
FOWLS.
General. See "Pernocton."
Bacterial diseases. See *Bacillus anthracis* infection, immunization, *Bacterium pullorum* infection, *Bact. sanguinarium* infection, Brucella infection in fowls, *Mycobacterium tuberculosis* infection in birds, *Pasteurella aviseptica* infection, *Past. pseudotuberculosis* infection, *Streptococcus*.
Diseases general. See Canker, Endothelioma, Fowl paralysis, Leg weakness, Leucaemia, Leucosis, fowl, Neoplasms, general, Osteitis, Respiratory system, diseases.
Metazoan parasites. See Anthelmintics, *Ascaridia*, *Davainea*, Helminth parasites, general, bird parasites, *Psilostomum ondatrae*.
Protozoan diseases. See *Aegyptianella pullorum*, Eimeria infection, avian, Spirochaetes.
Virus diseases. See Fowl plague, Fowl pox, Laryngotracheitis, infectious, Lymphomatosis, Myelomatosis, Newcastle disease.
FOXES. See also *Bacillus anthracis* infection, Distemper, Eimeria infection, canine, Encephalitis, Helminth parasites general, fox parasites, Lungworms, Mange.
Body temperature, heart activity and respiration of silver foxes 87
FRANCE. See Anaplasma infection, ovine, Aujeszky's disease, Brucella infection, general, Brucella infection in man, distribution, Congresses, *Cysticercus*, Helminth parasites general, dog parasites, Influenza, equine, Leishmania infection, Marseilles endemic typhus, Meat inspection, *Mycobacterium tuberculosis* infection in cattle, general, Refrigeration, *Theileria*.
FREEZING. See Refrigeration.
FREEZING POINT. See Cryoscopy.
FRENCH EQUATORIAL AFRICA. See Trypanosoma infection, general.
FRENCH SUDAN. See Rift Valley fever.
FRENCH WEST AFRICA. See Foot and mouth disease, general, Rabies, general.
FRIEDMANN'S VACCINE. See *Mycobacterium tuberculosis* infection general, immunization.
FUNGI, GENERAL. See also *Actinomyces*, Favus, *Mucor*, Skin, diseases, Staining, *Streptothrix*, *Trichophyton*.
Mycoses 19
Mycosis in chicks 160
Poisonous fungi in South Africa 595
Mycology applied to dairying 267
FUR ANIMALS. See also Foxes, Raccoons, Skunks.
Intestinal parasites of fur-bearing animals 168

G

PAGE

GAERTNER'S BACILLUS. See *Bacterium enteritidis*.
GALL-BLADDER.
Physiology of gall-bladder 63, 629
Pathology of gall-bladder 63
Dilatation of the gall-bladder as new observation in canine rabies 657
GAME ANIMALS AND BIRDS, DISEASES OF. See also Eimeria infection, general, Guinea fowls, Pheasants, *Syngamus*, *Trypanosoma rhodesiense*, *Trichostrongylus*.
Diseases of game 47
Blood parasites of wild game 713
GAPEWORMS. See *Syngamus*.
GAS GANGRENE.
Blackleg and gas gangrene 215
Gas gangrene in sheep 451
Culture method for gas gangrene diagnosis 650
GAS OEDEMA.
Gas oedema in cattle caused by Fraenkel's bacillus (*Clostridium welchii*) 216
GASES, POISONOUS.
Protection of animals against poison gas 389
GASTRIC JUICE.
Presence of substances stimulating secretion in pure gastric juice of dogs 134
GASTRITIS, MYCOTIC.
Gastric mycosis of pig 334
GASTRITIS, PARASITIC. See Stomach worms.
GASTROPHILUS. See Oestridae.
GAZELLE. See *Spirillum*.
GEESE. See Eimeria infection, avian, *Prosthogonimus*, *Syngamus*.
GENETICS. See also Heredity.
The mechanism of creative evolution 402
Genetic constitution in mice as differentiated by Aujeszky's disease and mouse typhoid 625
GENITAL SYSTEM. See also Castration, Cryptorchidism, Hermaphroditism, Ovary, Prepuce, Testicle.
Diseases. See also Abortion, Prepuce, Sterility.
Congenital and acquired deformities of sexual organs of cattle 377
Trichomonad infection of genital organs of cattle 228
Presence of bacteria in healthy and diseased genital organs of cattle 217
Forty cases of disease of genital system of the cow 119
Blood picture of cattle and dogs in genital diseases 768
Physiology.
Functional development of male gonad 182
Motility of spermatozoa in reproductive tract of ewe .. 631
Co-ordination of the reproductive processes 631
Sexual physiology of ferret 632
GERMANY. See also Anaemia, equine infectious, Babesia infection, equine, Borna disease, Braxy, Brucella infection in man, distribution, *Brucella abortus* infection in cattle, Colleges, *Fasciola*, Foot and mouth disease, general, Law, Milk, bacterial content, Milk, hygiene, *Mycobacterium tuberculosis* infection in cattle, Rabies, general, Streptococcal mastitis, general, Swine fever, general, *Trichophyton*, Vaccinia, Veterinary services.
Earth-borne diseases of cattle and sheep in Brandenburg and Pomerania 46
State control of veterinary medical sera and vaccines in Germany 293
Diseases of livestock in Germany 794, 795
GERMICIDES. See Disinfection.
GESTATION. See Pregnancy.
GLANDERS. See *Pfeifferella mallei* infection.
GLOBIDIUM.
Globidium infections of horse and ox in Sudan 29
Globidium infection in calf 714
GLOSSINA.
Tsetse-fly in Bechuanaland 36
Tsetse fly in Gold Coast Colony 75
Tsetse flies in Kenya 493
Tsetse fly problem in Southern Rhodesia 242, 359
Tsetse fly in Tanganyika Territory 296, 520
Glossina investigations in Uganda 790, 793
Ecology of *G. morsitans* and methods for its destruction .. 432
Method of marking tsetse flies 660
Density of tsetse flies 659, 660
Traps for tsetse flies 359, 490
Infection rate of *Glossina* and temperature 36
Trypanosoma infection rate in tsetse flies 243

PAGE

GLOSSINA [cont'd].
Cyclical passage of *Trypanosoma rhodesiense* through tsetse flies 721
Relative susceptibility of sexes of *Glossina* to infection with trypanosomes 659
Developmental stage of *Tryp. evansi* in *G. morsitans* .. 718
Transmission of trypanosomes by tsetse 102, 163, 425, 509
Spontaneous disappearance of flagellates from an infected *Glossina*.. 425
Biological cycle of trypanosomes in tsetse .. 243, 340, 425, 509
GLUCOSE. See Blood, chemical composition [sugar], Media.
GLUCOSIDE ANTHRAX VACCINE. See *Bacillus anthracis* infection, immunization.
GLUTATHIONE.
Distribution of glutathione in animal tissues 293
GOAT POX.
Goat pox in Nigeria 74
Goat pox in Turkey 259
GOATS.
General. See "Pernocton."
Bacterial diseases. See Brucella infection in goats, *Clostridium tetani* infection, *Cl. welchii*.
Diseases general. See Abortion, general, Dermatitis, pustular, Milk fever, Skin, diseases, Zoppina vomitoria.
Fungous diseases. See Favus, *Streptothrix*.
Metazoan parasites. See *Demodex*, *Haemonchus*, Mange, Nematodes, Stomach worms.
Physiology. See Blood, chemical composition [minerals], Rumination.
Poisoning. See *Baileya multiradiata*, *Chrysocoma tenuifolia*.
Protozoan diseases. See Babesia infection, caprine, Leishmania infection, Spirochaetes.
Virus diseases. See Agalactia, Goat pox, Peristomatitis, Pleuro-pneumonia, contagious caprine.
GOITRE.
Aetiology of goitre 50
Goitre in a lamb 440
GOLD.
Demonstration of gold in spirochaetes and trypanosomes .. 774
GOLD COAST COLONY See also *Brucella abortus* infection in cattle, general, *Glossina*, Pleuro-pneumonia, contagious bovine, general, Pleuro-pneumonia, contagious caprine, Pleuro-pneumonia, ovine, Protozoa, general, Reports, Rinderpest, Ticks, general, *Trypanosoma vivax*.
Diseases of livestock in the Gold Coast Colony .. 74, 75, 76
"GONACRINE."
Trials with "gonacrine" 57
Treatment of bovine piroplasmosis and anaplasmosis with "gonacrine" 193
Theileria dispar infection and "gonacrine" 609
GONGYLONEMA.
Cross transmission experiments with *Gongylonema* of ruminant origin 43
GORDURA GRASS.
Repellant and killing effects of gordura grass (*Melinis minutiflora Beauv.*) on seed tick 659
GRAFTING OF GLANDS. See Endocrine glands, grafting.
GRAHAMELLA.
Grahamella in wolves 231
GRAIN, PICKLED.
Feeding and toxicological experiments with pickled grain .. 390
GRAM'S REACTION. See Bacteria general, technique [general].
GRANULOMA.
Helminthic granuloma of equine skin 112, 746
GRANULOMA, NASAL BOVINE. See also *Schistosoma*.
Bovine nasal granuloma. Research at Muktesar 550
Nasal granuloma in U.S.A. 689
GRASS SICKNESS.
Grass disease investigation in south west Wales 766
GRASS TETANY.
Grass tetany 49, 122
Treatment of grass tetany 263
Grass tetany of dairy cows in New Zealand 295
GREAT BRITAIN. See also Anaemia, swine, *Bacillus anthracis* infection, general, Brucella infection in man, distribution, *Br. abortus* infection in cattle, control, *Clostridium ovitoxicum*, Colleges, Eimeria infection, general, Foot and mouth disease, general, Grass disease, Helminth parasites, general, Helminth parasites general, swine parasites, *Mycobacterium paratuberculosis* infection, *Mycobact. tuberculosis* infection in cattle, general, *Mycobact. tuberculosis* infection in swine, Paratyphoid group, *Psoroptes*, Pulpy kidney disease, Reports, Swine fever, general.
Diseases of livestock in Great Britain 188, 189, 190, 451
GREECE. See Babesia infection, bovine, Leishmania infection, Pleuro-pneumonia, contagious caprine.
GROWTH. See Auxin.
GUINEA FOWLS. See *Bacterium sanguinarium* infection, Testicle.
GUINEA PIGS. See *Bacterium enteritidis*, *Brucella abortus* infection, general, Eimeria infection, general, *Erysipelothrix rhusiopathiae* infection, general, Foot and mouth disease, general, *Ixodes*, *Mycobacterium tuberculosis*, BCG strain, *Mycobacterium tuberculosis* infection, general, immunity, *Pasteurella pseudotuberculosis*, Sunstroke, *Trichinella*, Trypanosoma infection, general, *Tryp. equiperdum* infection, diagnosis.
GUTTADIAPHOT.
Use of the guttadiaphot in veterinary practice 398
GUTTURAL POUCH.
Morphology and function of the guttural pouches of the horse 448
Endoscopical picture of the diseased guttural pouch of horses 448

H

HABRONEMA. See also Bursati.
Internal habronemiasis of horse caused by *H. megastoma* .. 112
Habronema species as parasites of the horse in Denmark .. 252
Cutaneous habronemiasis of horse 746
HAEMAGGLUTINATION.
Haemagglutination in animals 44
HAEMANGIOMA.
A cavernous haemangioma in subcutis of pig 261
HAEMAPHYSALIS.
H. bispinosa (in Fiji) 77
HAEMATOLOGY. See Blood, general.
HAEMATOZOA. See Protozoa.
HAEMATURIA, BOVINE.
Bovine enzootic haematuria 400
Bovine haematuria vesicalis in British Columbia 260
Research on bovine enzootic haematuria at Muktesar .. 551
HAEMOGLOBINAEMIA, EQUINE. See Myoglobinuria paralytica, equine.
HAEMOGLOBINURIA.
Redwater in horses and cattle 378
HAEMOGLOBINURIA, BOVINE. See also Babesia infection, bovine, Haematuria, bovine.
Redwater in horses and cattle 378
Bovine haemoglobinuria associated with *Clostridium welchii* 651
HAEMOGREGARINA.
Haemogregarines of birds 223
Removal, by new technique of microdissection, of a haemogregarine encysted in blood corpuscles 614
HAEMOLYSIN.
Haemolysin produced by streptococci in serum media as antigen and effect on antistreptolysin *in vitro* 173
HAEMOLYSIS.
Differentiation of blackleg and parablackleg bacilli by haemolysis reaction 785
HAEMONCHUS.
Serological diagnosis of *H. contortus* in sheep and goats 41, 365
H. contortus. Potential infestation curves under conditions of natural reinfection 41
H. contortus among calves in Queensland 554
Method of establishing pure infestations with *Haemonchus* in sheep 619
Nutritional factors affecting resistance to haemonchosis 524, 751
HAEMOPHILUS INFLUENZAE SUIS.
Position of *H. influenzae suis* in system of haemoglobinophilic bacteria and occurrence in pigs, sheep and cattle .. 600
HAEMOPOIETIC ORGANS. See Blood.
HAEMOPROTEUS.
H. columbae. Parasitological note 509
HAEMORRHAGE.
Haemorrhagic diathesis in calves 667
HAEMORRHAGIC SEPTICAEMIA, GENERAL. See Pasteurella infection, general.
HAEMORRHAGIC SEPTICAEMIA, BOVINE. See *Pasteurella bovisepticа* infection.
HAIR. See Alopecia.
HARES. See Eimeria infection, wild animals, Pneumonia, mycotic.
HEART.
Bovine cardiac cysticercosis 363
Cardiac action of staphylococcal toxin on rabbit and dog .. 409

PAGE

HEARTWATER.
Inclusion bodies in heartwater in Nigeria 74
Heartwater in cattle in Southern Rhodesia 555
Control of heartwater in East Africa 685

HEDGEHOGS. See Aujeszky's disease.

HELMINTH PARASITES, GENERAL. See also Anthelmintics, Cestodes, Nematodes, Trematodes.

General.
Helminthological Society of Washington. Proceedings of 144th to 148th meetings 244
Helminthology. A chapter in comparative medicine .. 742
Veterinary helminthology and entomology 795
Helminths of economic importance in farm animals, excluding poultry 743
Most common parasitic worms of domestic animals .. 168
Longevity of parasitic worms 113
Comparative pathology of helminths 245
Geological and hydrological influence upon spread of diseases caused by parasitic worms 247
Effect of heavy stocking on worm burden under system of rotational grazing 367
Review of Canadian helminthology 435
Helminths of farm animals in Colombia 750
Parasitic worms in animals in Jugoslavia 578
Helminth parasites in domestic and wild animals in Dutch East Indies 691
Helminthic material from Palestine 113
Problems in veterinary parasitology in Philippines .. 364
Helminth infestation in Nigeria 139
Helminths from South African bats 110
Helminth parasites from domesticated animals in Southern Rhodesia 435
Microscopic diagnosis of parasitism in domestic animals .. 136
Diagnosis of helminthic infections: twelve year survey .. 246
Prophylactic action of vitamin A in helminthiasis 129

Bird parasites. See also *Ascaridia, Davainea, Psilostomum.*
Poultry worms collected at Utrecht 248
Parasitic worms of birds in Dutch East Indies 523
Helminthic parasites of fowl and pigeon in Queensland .. 246
Treatment of intestinal helminthiases of fowl and pigeon with arecoline hydrobromide 59
Effects, treatment and prevention of worm infestation in poultry 60

Cat parasites. See also *Aelurostrongylus*, Cestodes, general, *Echinococcus, Opisthorchis, Osleroides, Syngamus, Toxocara.*
Helminths of cats in China 743
Parasitic worms of cats in Palestine 743

Cattle parasites. See *Cysticercus, Fasciola*, Nematodes, *Schistosoma, Stephanofilaria*, Stomach worms, Strongyles, *Syngamus.*

Dog parasites. See also *Ancylostoma*, Cestodes, general, *Dioctophyme, Diphyllobothrium, Dirofilaria, Filaria*, Orthophenylphenol, *Parametorchis, Taenia, Thelazia, Trichinella.*
Helminth parasites in pariah dogs 110
Helminth parasites of dogs in Marseilles 247
Parasitic worms of dogs in Palestine 743

Fox parasites. See also Lungworms.
Worms in foxes 127
Parasites of urinary organs of silver foxes 743

Game parasites.
Helminthiasis in game animals 48

Horse and mule parasites. See also Ascarids, *Habronema, Trichostrongylus*, Strongyles.
Helminthic granuloma of equine skin 112
Bacterium coli and *Bact. equirulis* septicaemia of verminous origin, mostly in young mule 209

Sheep parasites. See also *Bunostomum, Cysticercus, Fasciola, Haemonchus*, Hookworms, Nematodes, general, *Oesophagostomum, Ostertagia, Schistosoma*, Stomach worms, Strongyles, *Syngamus, Trichostrongylus.*
Treatment of helminthiasis in sheep by pasture rotation and drug treatment 274

Swine parasites. See also *Cysticercus, Diphyllobothrium, Stephanurus*, Stomach worms, *Trichinella.*
Parasitic worms of pigs in England 669
Helminthiasis of swine in Madagascar 744

HEMIPTERA. See *Lyctocoris.*
HENRY'S REACTION. See Tests, serological [flocculation].
HENS. See Fowls.
HEPATITIS, NECROTIC. See Braxy.

PAGE

HEREDITY. See also Genetics.
Hereditary transmission of *Trypanosoma cazalboui-vivax* in cattle 26
Inheritance as a factor in resistance to an infectious disease 253, 254
Inheritance of immunity 254
Heredity in parasitic diseases. Prenatal ascaridiasis 435
Heredity in fowl paralysis 533

HERMAPHRODITISM.
Castration of hermaphrodite mammals 438
Ovarian tissue in bisexual pigs 531

HETERAKIS.
Life-history of *H. gallinae* 364

HIDES.
Disinfection of anthrax hides 6
Localization and sporulation of *Bacillus anthracis* in hides of animals which have died of anthrax 409
Can the dried hides of infected animals spread rinderpest? .. 615

HISTOMONAS MELEAGRIDIS INFECTION.
Blackhead in turkeys 342, 717
Cecal occlusion in the prevention of blackhead in turkeys .. 342

HISTORY.
History of National Research Council (U.S.A.) 1919-1933. Division of medical sciences 491
History of veterinary medicine in the U.S.A. 788
Historical retrospect on veterinary science in Germany .. 787

HOG CHOLERA. See Swine fever.

HOGS. See Swine.

HOLLAND. See also Aujeszky's disease, Brucella group, general, *Br. abortus* infection in cattle, general, Committees, *Cysticercus*, Foot and mouth disease, general, Fowl pox, Helminth parasites general, bird parasites, *Mycobacterium paratuberculosis* infection, *Mycobact. tuberculosis* infection in cattle, general, Reports.
Diseases of livestock in Holland 793, 794

HOLTH'S REACTION. See *Brucella abortus* infection in cattle, diagnosis [complement-fixation test].

HOOKWORMS. See also *Ancylostoma, Bunostomum, Necator, Uncinaria.*
Variations in hookworm disease 40
Brine for destruction of hookworm larvae 245
Hookworm of sheep in New South Wales 524
Sparrows and farmyard animals as spreaders of hookworm eggs 754

HOPPEGARTEN COUGH. See Cough, Hoppegarten.

HORMONES. See Endocrine gland, hormones, Oestrum, Pregnancy, diagnosis, Sex hormones and under name of gland.

HORSE FLIES. See Tabanids.

HORSE-SICKNESS.
Infection of white mice and guinea pigs with virus of horse-sickness 32
Infection of rats with virus of South African horse-sickness .. 164
Effect of light on immunizing properties of formolized horse-sickness virus 571
Immunization against horse-sickness by formalinized virus .. 347
Control of horse-sickness in East Africa 684
Horse-sickness in Kenya Colony 144, 493
Horse-sickness in South Africa 589
Horse-sickness in Southern Rhodesia 555

HORSES.
General. See also Breeding, Foetus, Obstetrics.
First aid hints for the horse owner 196
Plantation horse management 294
Bacterial diseases. See *Bacterium abortus equi* infection, Brucella infection in horses, *Clostridium botulinum* intoxication, *Cl. tetani* infection, *Erysipelothrix rhusiopathiae* infection, *Mycobacterium tuberculosis* infection in horses, Paratyphoid group infection, *Pfeifferella mallei* infection, *Streptococcus.*
Diseases general. See also Abortion, general, Cough, Hoppegarten, "Dry coat" in horses, Fistulous withers, Granuloma, Grasssickness, Haemoglobinuria, "Kumri", Lameness, Laminitis, Melanoma, Myoglobinuria paralytica, equine, Neoplasms, general, Neuritis, Osteoarthritis, Osteodystrophia fibrosa, Paralysis, general, Poll evil, Purpura haemorrhagica, Shivering, Sterility, Stringhalt.
Periodontal disease in adult cart-horses 531
Non-sweating of horses in India 551
Fungous diseases. See *Actinomyces*, Botriomycosis, *Trichophyton.*
Metazoan parasites. See Anthelmintics, Ascarids, Bursati, *Habronema*, Helminth parasites general, horse parasites, Mange, Oestridae, Parasitic infestation, general, *Schistosoma, Trichostrongylus*

PAGE

HORSES [cont'd].
Physiology. See Blood, general, Blood, groups, Blood, picture, Blood, serum, Guttural pouch, Oestrum, Pregnancy.
Poisoning. See Doping.
Protozoan parasites. See Babesia infection, equine, *Globidium*, Trypanosoma infection, general, *Tryp. evansi* infection, *Tryp. vivax*.
Virus diseases. See Anaemia, equine infectious, Borna disease, Encephalomyelitis, equine, Horse-sickness, Influenza, equine, Marseilles endemic typhus, Rabies.
HUNGARY. See Law, *Phlebotomus*.
HUSBANDRY. See Zootechny.
HYALOMMA.
Bionomics and biology of *Hyalomma* ticks 431
HYDATID DISEASE. See *Echinococcus*.
HYDROCEPHALUS.
Hydrocephalus in domestic animals 767
HYDROCYANIC ACID.
Development of prussic acid in cholam (*Sorghum vulgare*) .. 539
Determination of hydrocyanic acid in plants 627
HYDROGEN ION CONCENTRATION.
Colorimetric estimation of pH of blood 292
HYGIENE. See Food hygiene, Public health.
HYGROMA.
Br. abortus infection and hygromata of cattle 322
HYMENOPTEROUS PARASITES. See *Brachymeria*.
HYPERICUM.
Photodynamic action of *H. ethiopicum var. glaucescens* Sond. and *H. leucoptychodes* 677
HYPODERMA. See Oestridae.
HYPOPHYSIS. See Pituitary.

I

ICE CREAM. See Milk.
ICELAND. See Braxy, Fluorine.
IMMUNITY, GENERAL. See also Agglutinins, Allergy, Anachoresis, Antibodies, Antiserum, Blood, groups, Haemagglutination, Opsonin, Saponin, Serum, Shwartzman's phenomenon, Tests, Vaccines and under name of specific infection.
An outline of immunity 451
Inheritance of immunity 253, 254
Immunity and the nervous system 254
Heterologous experience (immunization) as a factor in resistance to disease 442
Differentiation between acquired and genetic immunity .. 476
Influence of nervous system and of various biological and psychological factors on immunity 558
Bacteriology, immunobiology and cosmic rays 663
Role of the reticulo-endothelial system in immunity 45
Participation of cutaneous epithelium in immunity response 117
The skin as immunological organ 663
Species immunity to virulent streptococci 303
IMPETIGO.
Impetigo in lambs 532
INCLUSION BODIES. See also Elementary Bodies.
Inclusion bodies in fowl pox 35, 734
Nature of cell-inclusions in virus diseases 682
Intranuclear inclusions in epizootic fox encephalitis .. 349
Intranuclear inclusion in yellow fever 239
Nuclear inclusions in liver in Rift Valley fever 469
INDIA. See also Babesia infection, bovine, Babesia infection, caprine, Babesia infection, equine, *Bacterium abortus equi* infection, Blindness, *Brucella abortus* infection in cattle, diagnosis [general], Bursati, *Corynebacterium*, general, *Corynebact. pseudotuberculosis ovis*, Distemper, dog, *Fasciola*, Granuloma, nasal bovine, Haematuria, Horses, diseases general, "Kumri," *Mycobacterium paratuberculosis* infection, general, *Mycobact. tuberculosis* infection *general*, *Mycobact. tuberculosis* infection in cattle, general, Nematodes, general, Paralysis, general, Pneumonia, general, Reports, Research Institutes, Rinderpest, *Schistosoma*, Serum institutes, *Simulium*, Stomach worms, *Streptococcus equi* infection, Trypanosoma infection, general, *Tryp. evansi* infection.
Improvement in livestock in India 185
Diseases of livestock in India .. 399, 400, 401, 550, 551, 552
INFECTION, RESISTANCE TO. See Immunity.
INFECTIOUS BULBAR PARALYSIS. See Aujeszky's disease.
INFECTIOUS ENTERO-HEPATITIS OF TURKEYS. See *Histomonas meleagridis* infection.
INFLAMMATION.
Studies on inflammation 441

PAGE

Cytology of inflammatory exudate set up by the intradermal injection of tuberculin 526
INFLUENZA, EQUINE.
Equine influenza at the Saumur Military Academy 511
INFLUENZA, HUMAN.
A virus obtained from influenza patients 357
Similarity of virus pneumonia in animals to epidemic influenza and interstitial broncho-pneumonia in man 358
INFLUENZA, PORCINE.
Swine influenza 573
INFRA-RED PHOTOGRAPHY.
Infra-red photography 496
INFUSORIA.
Infusoria of rumen and significance for nutrition of ruminants 62
INHERITANCE. See Heredity.
INSECTICIDES. See Derris, Rotenone, Tar, Turpentine.
INSECTS, GENERAL. See Entomology.
INSEMINATION, ARTIFICIAL.
Technique of artificial insemination 544
INSPECTION OF FOOD. See Food hygiene.
INSTITUTES. See Research institutes, Serum institutes.
INTERNAL SECRETION. See Endocrine glands.
INTESTINES. See also Eosinophilia.
Acari in intestinal tract of dogs 361
Stenosis with multiple diverticulae in small intestine of cow 378
INTOXICATION. See Poisoning.
INTRADERMAL TEST. See Tests, skin.
INTRANUCLEAR INCLUSIONS. See Inclusion bodies.
INVERTEBRATE VECTORS. See also *Culicoides*, *Glossina*, *Simulium*, Snails, *Stomoxys*, Tabanids, Ticks.
Significance of ascaris larvae as carriers of disease 750
IODINE. See also Thyroid glands.
Iodine survey of New Zealand livestock 490, 630
Use of iodine compounds in treatment of thyroid disease .. 387
IRISH FREE STATE. See Brucella infection in man, general, Reports.
IRON. See also "Bush sickness".
Action of iron sulphate against anaemia of suckling pigs .. 177
Use of reduced iron for cultivation of anaerobic organisms .. 395
ISOSPORA. See also *Eimeria*.
I. theileri n.sp. A coccidium of jackal 339
Diurnal gametic periodicity in avian *Isospora* 339
I. bigemina from dog 565
ITALIAN NORTH AFRICA. [TRIPOLI]. See Leishmania infection, Typhus.
ITALY. See Brucella infection in man, Leishmania infection, Theileria infection, general, *Th. parva* infection.
IXODES.
Tick-borne fever of sheep. Transmission by *I. ricinus* .. 106

J

JACKALS. See Aujeszky's disease, *Isospora*, Spirochaetes.
JAMAICA. See also Reports.
History of Hope Farm and Part I of Jamaica Herd book .. 186
Diseases of livestock in Jamaica 450
JAPAN. See Fowl plague.
JAPANESE FOWL PLAGUE. See Fowl plague.
JAVA. See Dutch East Indies.
JOHNE'S DISEASE. See *Mycobacterium paratuberculosis* infection.
JOHNIN. See *Mycobacterium paratuberculosis* infection.
"JOINT ILL."
"Joint ill" 120
JUGOSLAVIA. See *Bacillus anthracis* infection, immunization, Colleges, Encephalomyelitis, equine, Entomology, general, Helminth parasites, general, Mites, Rabies, general.

K

K MEDIUM. See Media.
KALA AZAR. See Leishmania infection.
KALMIA MICROPHYLLA.
Alpine kalmia (*Kalmia microphylla*) as a stock-poisoning plant 539
KED (MELOPHAGUS OVINUS).
Sheep ked and eradication by dipping 431
Life history and control of sheep ked in New Zealand .. 359
Ked infestation of sheep in New South Wales 553
KENYA COLONY. See also Anaplasma infection, bovine, Babesia infection, general, East African swine fever, Foot and mouth disease, general, Fowl paralysis, *Glossina*, Horse-sickness, Nairobi sheep disease, Pasteurella infection, general, *Past. bovisepticа* infection, Pleuro-pneumonia, contagious bovine, Pleuro-pneumonia, contagious caprine,

PAGE

KENYA COLONY [cont'd].
Rabies, Reports, Rift Valley fever, Rinderpest, "Snotsiekte," Sterility, Sweating sickness, *Theileria parva* infection, Ticks, general, *Trichostrongylus*, Typhus.
Diseases of livestock in Kenya .. 142, 143, 144, 491, 492, 493, 634, 635

KERATITIS, INFECTIOUS.
Infectious keratitis of cattle 767

KETOSIS. See Acetonaemia.

KIDNEY WORMS. See *Stephanurus dentatus*.

KIDNEYS.
Kidney coccidiosis of geese in Russia 21
Physiology of kidney 628

KOREA FOWL DISEASE. See Fowl plague.

"KUMRI."
Research on "kumri" in horses 190
Aetiology of "kumri" 261
"Kumri" in India 400

KUPFFER CELLS. See Reticulo-endothelial system.

L

LABORATORIES. See Research institutes.

LACTATION.
Diseases of lactating cows associated with intracytoplasmic blue bodies 120
Methods of drying up cows 133
Effect of salts on cell permeability as shown by studies of milk secretion 630
Effect of Bang's disease on milk production 124
Prolonged lactation periods 784

LACTATION TETANY. See Grass tetany.

LAMB DYSENTERY.
Strain of *Clostridium welchii* producing fatal dysentery in lambs 422
Cl. welchii, lamb dysentery bacillus, and *Cl. paludis*. An examination of single-cell cultures 422

LAMBS. See also *Actinomyces*, Ataxia, "Cripples," Enteritis, *Erysipelothrix rhusiopathiae* infection, Impetigo, Lamb dysentery, Pulpy kidney disease, Sore mouth, *Trichostrongylus*, "White-muscle disease," Wool.
Diseases of young lambs 120

LAMENESS.
Shifting lameness in horses 531

LAMINITIS.
Aetiology and pathogenesis of nutritional laminitis in horses 625

LANTANA.
Lantana poisoning of cattle in Fiji 77

LARYNGOTRACHEITIS, INFECTIOUS.
Desiccation and preservation of infectious laryngotracheitis virus 520
Immunology of infectious laryngotracheitis 520

LAW.
Regulations of Hanover Provincial Chamber of Agriculture for voluntary eradication of abortion 211
Swine paratyphoid. New decree concerning Norway .. 320
French laws relating to meat inspection 486
Survey of Veterinary Act, South Africa, 1933 549
Regulations governing epizootic diseases in Spain 549
New Hungarian Veterinary Law 549
Law of June 1932 on control of bovine and porcine tuberculosis, Denmark 598
Law on prevention of animal diseases in Bulgaria 786

LEATHER. See Hides.

VAN LEEUWENHOEK, ANTHONY.
The tercentenary of Anthony van Leeuwenhoek, inventor of microscope 71

LEG WEAKNESS.
Leg weakness in chickens 382

LEGISLATION. See Law.

LEISHMANIA INFECTION.
General.
Visceral leishmaniasis of animals 227
Cutaneous leishmaniasis 426
Leishmaniasis in Greece 464
Leishmaniasis in Tripoli 426
Kala azar in Marseilles district 426
Leishmaniasis in Sardinia 426
Culture of leishmania in goats' milk 464
Cat in transmission of Mediterranean kala azar 722
Effect of ultrafiltration on leishmania sera 723
Action of antimony on leishmania sera 723
Diagnosis for visceral leishmaniasis 426
Specific sero-flocculation in kala azar 756
Canine.
Canine kala azar in Catania 722
Dog as reservoir of kala azar 569
Presence of parasites in affected dogs 426
Visceral leishmaniasis in dogs 723
Skin lesions in dog resembling oriental sore 722
Diagnosis of leishmaniasis in dogs 103, 227, 426

LEPTOSPIRA INFECTION.
Diagnosis of Weil's disease in dogs 30
Spirochaeta ictero-haemorrhagiae, in sheep, kid and young pig 230

LEUCAEMIA.
Splenic leucaemia in cow 410

LEUCAEMIA, AVIAN.
Transmissible leucaemia of fowls 575

LEUCOCYTES. See Blood, corpuscles [white].

LEUCOCYTOZOON ANATIS INFECTION.
Control of *L. anatis* Wickware 102
Cytology of *L. anatis* Wickware 102
Malaria-like disease of ducks caused by *L. anatis* 715

LEUCOSIS, AVIAN.
Lymphomatosis, myelomatosis and endothelioma of chickens caused by filtrable agent 380
Susceptibility of chickens to transmissible leucosis 575
Pathology of spontaneous leucosis 624

LEUCOSIS, BOVINE.
Lymphadenosis of cattle 118, 767
Transmissible bovine anaemia and relation to leucosis .. 767

LEVANT.
Diseases of sheep in French mandated territory in Levant .. 175

LICE.
Louse feeding on blood of host 167
Lice infestations of sheep in New South Wales 553
On question of food of *Mallophaga* 662
Skin disease of pigs caused by lice 732
Pyrethrum for winter control of lice 774

LICKS, STOCK.
Effects of mineral licks on sheep 545

LIGHT.
Lethal action of light on rats 481
Effect of light on immunizing properties of formolized horse sickness virus 571
Lethal effect of light on vaccine virus 658

LIGHTNING STROKE.
Lightning stroke in cattle and sheep 176

LIMONITE.
Limonite as a prophylactic against "bush sickness" 445

LIMNAEA TRUNCATULA. See Snails.

LIPPIA.
Toxicity of *L. Rehmanni* and *L. pretoriensis* 677

LIQUOR FOLLICULI.
Treatment of sterility in both sexes by liquor folliculi .. 130

LITHUANIA. See Rabies, general.

LIVER.
Corynebacterium pyogenes causing abscesses in liver of calves 94
Idiopathic haemorrhagic hepatitis of swine 379
Hepatic cirrhosis in domestic animals 379
Cytological changes in liver in Rift Valley fever 469
Effect of surgical obstruction of normal bile flow 677

LIVER FLUKES. See *Fasciola*.

LOPHOLAENA CORIIFOLIA.
Toxicity of *L. coriifolia* (Harv.) 677

"LOUPING ILL."
Histopathology of "louping ill" 105
"Louping ill" in sheep and in man 729
Tick transmission of "louping ill" 105, 350
Transmission of "louping ill" to field voles 350
Relation of poliomyelitis to "louping ill" 350
Cultivation of "louping ill" virus 350

LUCILIA.
White-eyed mutant race of *L. cuprina* Wied. 522
Larval myiasis in sheep caused by *L. sericata* 471
Differential behaviour of *L. sericata* Meig. and *L. caesar* L. .. 619

LUNG.
Abdominal lungs in calf 481
Pulmonary lithiasis in sheep 670
New nematode from lung of the cat, *Osleroides massino* .. 754

LUNGWORMS. See also *Aelurostrongylus*, *Dictyocaulus*.
Lungworm disease of badger 364
Biology of metastrongyles and diagnosis of lungworm infestation 744
Treatment with tracheal brushes for removal of lungworms from foxes 127
Control of lungworm disease in maritime districts 169

LUPINS.
Poisoning of horses by *Lupinus luteus* 779

PAGE

LYCTOCORIS CAMPESTRIS.
L. campestris, a blood-sucking bug of cattle 244
LYMPH GLANDS.
Tuberculosis of the lymph glands of dog 644
Diagnostic value of lymph gland changes in swine fever .. 729
LYMPH NODES.
Studies on mature and immature lymphoid cells of lymph nodes of normal rats and rats infected with *Trypanosoma brucei* 612
LYMPHADENOSIS. See Leucosis.
LYMPHATIC SYSTEM.
Lymphatic system of hind limb of cattle and swine 628
Lymphatic system of shoulder of ox 628
Anatomy of lymphatic system of cat 87
Lymph glands of organs and body of dog at various stages of life 394
Induced alterations in permeability of lymphatic capillary 135
LYMPHOCYTES. See Blood corpuscles [white].
LYMPHOGRANULOMA INGUINALE.
Transmission of virus of lymphogranuloma inguinale to cat and rabbit 166
LYMPHOMATOSIS.
Malignant lymphomatosis and contagious abortion 321
Lymphomatosis, myelomatosis and endothelioma of chickens caused by a filtrable agent 380
LYPEROSIA.
Role of temperature and humidity on incidence of *L. exigua* 522
Buffalo fly in Queensland 554
Investigations on the buffalo fly *L. exigua* de Meij 577

M

MACHINE MILKING. See Milking.
MADAGASCAR. See Helminth parasites general, swine parasites.
"MAD ITCH." See Aujeszky's disease.
MAGGOTS. See Blowflies.
MAGNESIUM.
Changes in magnesium of serum of blood of cows at calving and of calf during early life 768
Effect of magnesium supplements on growth of Merino sheep 131
Magnesium in animal diets 289
Magnesium in blood of sheep and cows 630
"MAKEBBE."
Tick-borne disease, "Makebbe" 790
MAL DE CADERAS, BOVINE, NON-TRYPANOSOME. See also Rabies, Trinidad and South American virus.
Mal de caderas (non-trypanosome) of bovines in Paraguay .. 517
MALARIA. See Plasmodium infection
MALAYA. See Federated Malay States, Straits Settlements.
MALIGNANT CATARRH, BOVINE. See Catarrh, malignant bovine.
MALIGNANT OEDEMA. See *Clostridium oedematiens* infection.
MALIGNANT TUMOURS. See Neoplasms.
MALLEIN. See *Pfeifferella mallei* infection.
MALLOPHAGA. See Lice.
MALTA FEVER. See Brucella infection in man.
MAMMARY GLAND. See Udder.
MAN, DISEASES OF ANIMALS TRANSMISSIBLE TO AND FROM. See Actinobacillus infection, *Amoeba*, *Bacterium suipestifer* infection, *Balantidium*, Brucella infection in man, Eimeria infection, general, *Erysipelothrix rhusiopathiae* infection, Foot and mouth disease, Influenza, Leishmania infection, general, "Louping ill," Milk, diseases transmitted by, *Mycobacterium tuberculosis* infection in man, Parasitic infestation, general, Psittacosis, Rabies, *Schistosoma*, Skin, diseases, Sore mouth, Stomatitis, Streptococcus infection, *Thelazia callipaeda*, *Trichinella*, *Trichomonas*, Trypanosoma infection, *Tryp. rhodesiense*, Vaccinia.
MANGE. See also *Demodex*, *Psoroptes*.
Mange in chamois and foxes 48
Cattle mange in U.S.A. 689
Horse mange in U.S.A. 689
Goat mange in U.S.A. 689
MAREK'S PARALYSIS. See Fowl paralysis.
MARES. See Horses.
MARMITE.
Nature of haemopoietic factor in marmite 283
MARSEILLES ENDEMIC TYPHUS.
Animal reservoirs of 430
Marseilles endemic typhus at Toulon 431
Typhus and Marseilles endemic typhus 431
Sensitivity of the horse to the virus of 470
Weil-Felix reaction in dogs at Constantza 737
MASTITIS, BOVINE. See also *Mycobacterium tuberculosis* infection in cattle, udder infection, Streptococcal mastitis.
Mastitis and deficiency of carbohydrate. Origin and prevention of mastitis 6
Paraplegic mastitis in milch cows 305
Yeast as cause of mastitis in cows 711
Mastitis in Ceylon 593
Mastitis in Fiji 77
Mastitis in New Zealand 295
MASTOIDITIS.
Mastoiditis in pigs caused by *Corynebacterium pyogenes* .. 599
MAURITIUS. See also *Mycobacterium tuberculosis*, BCG strain, *Mycobact. tuberculosis* infection in cattle, general, Reports, *Trypanosoma evansi* infection.
Diseases of livestock in Mauritius 687, 688
MEAT INSPECTION. See Food hygiene.
MEAT POISONING. See Food poisoning.
MEAT PRODUCTS.
Protective coatings of meat products 383
MEDIA. See also Bacteria general, technique [cultivation].
A semi-solid medium for anaerobic cultivation 395
Effects of media on bacterial filtrability 650
Best method for sterilizing culture media containing glucose 395
Sterilization of gelatine culture media 448
"K" (Kendall's) medium 19, 396
Merck's culture medium in meat inspection 271
Simmons' synthetic medium in meat inspection 271
Enrichment methods for meat inspection 271, 771
Production of tuberculin in glycerin broth and Sauton's medium respectively 369
Egg medium for culture of tubercle bacillus 9
Herrold's egg yolk agar medium for isolation of bovine tubercle bacillus 699
Brucella group in egg media 606
Differentiation of brucella by growth on egg media 503
Selective medium for identification of *Br. abortus* in milk .. 419
Selective medium for the diagnosis of streptococcus mastitis 303
Modification of *Pfeifferella mallei* on ox bile media 458
MEDICINE, GENERAL. See also Tropical medicine.
Scientific literature of the U.S.S.R., 1928. Medicine .. 588
MEDITERANNEAN FEVER. See Brucella infection in man.
MELANO-FLOCCULATION. See Tests, serological [flocculation].
MELANOMA.
Equine melanomatosis 117
MELES TAXUS. See Badgers.
MERCURIALIS ANNUA.
M. annua poisoning in cattle 62
MERCURIC CHLORIDE TEST. See Tests, serological [mercuric chloride].
MERCURY.
Mercury poisoning 390
METABOLISM, GENERAL. See also Acetonaemia, Bilirubin, Deficiency diseases, Grass tetany, Milk fever, Minerals, metabolism.
Modern theories of development 81
Effect of nematode infestations on the metabolism of the host 748
Importance of assessing the effects of salivary secretion in the interpretation of the results of metabolism and mineral balance experiments 676
"METAPHEN".
"Metaphen." Experimental evaluation as antiseptic and disinfectant 676
METHODS. See Technique.
METHYLENE BLUE.
Methylene blue as antidote for cyanide poisoning 272
Inactivation of canine distemper virus by methylene blue .. 237
Action of methylene blue on fixed rabies virus 656
METRITIS.
Treatment of metritis of cows with "entozon" 129
Metritis and vaginitis of cows caused by *Corynebacterium pyogenes* 457
MICE. See also Ascarids, Ectromelia, infectious, Epidemiology, Fowl plague, general, Rabies, diagnosis, *Streptococcus*, Sunstroke, *Trypanosoma brucei*, *Tryp. congolense*, *Tryp. duttoni*.
An epizootic disease occurring in mice 212
MICRODISSECTION.
Removal, by new technique of microdissection, of a haemogregarine encysted in blood corpuscles 614

PAGE

MICROSCOPY.
Industrial microscopy 83
Handbook on microscopy 692

MILK. See also Lactation.
General.
Controlling ropy milk outbreaks 674
Drugs which are excreted in milk 128
Effect of payment by quality on milk sold in Copenhagen 53
Abnormal flavours in milk 54
Correlation between certain properties of milk and type of inflammation in acute mastitis 198
In defence of raw milk 537
Effect on the milk of drinking water contaminated with sewage 769
Bibby's book on milk 771
Bacterial content.
Bacteria in milk, general 54, 133, 267, 304, 483
Bacteriological examination of milk, general 672
Bacteriological examination of milk, technique 484, 673, 770
Effect of pasteurization on 673
Bacterium coli in milk 54, 179, 270, 535
Brucella in milk 124, 157, 179, 270, 304, 332, 419, 484, 501, 538, 582
Corynebacteria in milk 93
Mycobacterium tuberculosis in milk 266, 385, 481, 482, 484, 535, 582, 663, 672
Other acid-fast bacteria in milk 266, 535
Streptococci in milk 302, 407, 538
Cell picture.
Cell picture of milk in tuberculous mastitis 305
Leucocyte content of milk for detection of mastitis .. 305
Composition.
Proteins of cow's milk 285
Composition of milk-fat of Indian camels 630
Diseases transmitted by. See also Brucella infection in man, *Mycobacterium tuberculosis* infection in man.
Prophylaxis of milk-borne disease 485
Epidemics of septic sore throat of milk origin 53
Milk-borne scarlet fever 270, 407
Undulant fever transmitted by cow's milk 421
Heating. See also Pasteurization.
Schern-Gorli test for fresh and heated milk 125
Hygiene.
Guarding milk supplies in small municipalities 125
Necessity for a safe milk supply 485
Does *Bacterium coli* indicate unclean milking? 538
Milk inspection in various countries 178
Annual report on veterinary bacteriological examination of milk, Hanover, 1932 267
Manual for milk testers in New Jersey 268
Essentials in quality milk production 769
Nutrition.
Antirachitic value of milk from cows fed irradiated yeast .. 55
Value of raw or heated milk for children 55
Nutritive properties of milk in relation to pasteurization .. 268
Pasteurization.
Tests for pasteurized milk 79, 537
Bacteriology of low-temperature pasteurization 267
Compulsory pasteurization of milk 269
Hygienic estimation of pasteurized milk 483
Acidoproteolytic and thermophilic organisms in pasteurization of milk 484
Bacteriological studies of high-temperature short-time pasteurizer 537
Problem of killing *Mycobact. tuberculosis* by pasteurization 583
Freezing-point of pasteurized and sterilized milks .. 583
Bacterial flora of high-grade milk before and after pasteurization 673
Resistance of streptococci to pasteurization 770
Therapy.
Sour milk in avian coccidiosis 386

MILK-BORNE DISEASES. See Milk, diseases transmitted by.

MILK FEVER.
Electrolyte content in the blood serum of sheep, goats and cows in milk fever 285
Pathogenesis of milk fever 327
Milk fever of ewes in New Zealand 582
Hypoglycaemia and hypocalcaemia as causes of milk fever in cows 671
Calcium therapy in milk fever 387, 776

MILK SECRETION. See Lactation.

MILK SICKNESS. See Trembles.

PAGE

MILKING. See also Milk, hygiene.
Can chronic streptococcus mastitis be transmitted to healthy cows by milking? 3
Galactogenous infection and influence of stripping on course of streptococcal mastitis 4
Mastitis and machine milking 146

MILKING MACHINES. See Milking.

MINERAL CONTENT OF PASTURES. See Pastures.

MINERALS.
Deficiency. See also "Bush sickness", Calcium, Grass tetany, Milk fever, "Peg-leg," Phosphorus.
Mineral deficiency diseases in domestic animals .. 51, 52, 263
Mineral deficiency in New South Wales 440
Deficiency disease of sheep in New Zealand 581
Deficiency diseases of animals in South Africa 79
Disease of King Island stock arising from mineral deficiency 265
Ciliates in rumen of cow affected with mineral deficiency and their possible inter-connection 229
Osteitis in poultry caused by mineral deficiency 177
Change in composition of bone of rats on a diet poor in inorganic constituents 629
Metabolism. See also Calcium, Magnesium, Phosphorus, Sodium.
Mineral metabolism 131
Interpretation of the results of metabolism and mineral balance experiments 629
Neuromuscular excitability in relation to biochemistry of minerals 279, 280

MITES.
Acari in the intestinal tract of dogs 361
Parasitic mites of domestic animals in Jugoslavia 742
Histological changes caused by mites 742

MONGOOSE. See Eimeria infection, general.

MONIEZIA EXPANSA.
Life history of *M. expansa* 110

MONKEYS. See Plasmodium infection.

MOOSE. See also *Dermacentor*.
Diseases affecting moose 479

MOROCCO. See also Anaemia, equine infectious, Anaplasma infection, bovine, Aujeszky's disease, Babesia infection, bovine, *Bacillus anthracis* infection, immunization, "Darmous," Rabies, immunization, Reports, Research institutes.
Diseases of livestock in Morocco 193

MORPHINE.
Excretion of morphine by normal and tolerant dogs 276
Action of morphine on mammalian circulation 276
Relation of dosage to development of tolerance to morphine in dogs 276

MOSQUITOES. See also *Aëdes*, *Culicoides*.
Mosquitoes as vectors of equine encephalomyelitis 107
Mosquitoes kill livestock 168

MUCOR.
Mucor mycosis in pig 220

MULES. See Helminth parasites general, horse and mule parasites, Rabies, Setaria.

"MURRINA." See Trypanosoma infection general, general.

MUSCA.
Revision of genus *Musca* 37
The genus *M. linnaeus* 243

MYCOBACTERIUM, GENERAL.
Research on the paratubercle bacilli of Moeller and Grassberger 11
A paratubercle bacillus 11
Sensitivity of chickens to tuberculin following exposure to different varieties of acid-fast bacilli 255
Acid-fast bacteria, in milk 266, 535

M. PARATUBERCULOSIS INFECTION [JOHNE'S DISEASE].
General.
Johne's disease 206, 315, 457
Johne's disease in sheep 451, 457
Johne's disease in Great Britain 478
Johne's disease in Friesland 498
Johne's disease in India 399
Johne's disease in New Zealand 294
Control.
Diagnosis and control of Johne's disease 10
Control of Johne's disease 599, 701
Suggestions for control of Johne's disease in U.S.A. .. 689
Johnin.
Preparation of a synthetic johnin 372, 599

PAGE

M. TUBERCULOSIS.
General.
The tubercle bacilli 88
Anaerobiosis of tubercle bacilli: 90
Changes which occur in tubercle bacillus in relation to developing tubercle 114
Schrön-Much granules in *M. tuberculosis* from bovine lesions 457
Avirulent tubercle bacilli and "exotuberculin Finzi" .. 370
Attenuated strains. See also *M. tuberculosis*, BCG strain.
Allergy in the guinea pig injected with attenuated tubercle bacilli 369
M. tuberculosis attenuated by rapid subcultivation . 701
Avian type. See *M. tuberculosis*, types.
BCG strain. See also *M. tuberculosis* infection in cattle, immunization.
Effects of BCG on spermophiles 9
Virulence of BCG 206, 701
Studies on BCG and vaccination against tuberculosis . 312
Type stability of BCG 700
Biology.
Biology of the tubercle bacillus 201, 204
Bovine type. See *M. tuberculosis*, types.
Cultivation.
Egg medium for culture of tubercle bacillus 9, 89
Cultivation of tubercle bacilli suspended in bile .. 89
Attempt to grow tubercle bacilli within single-celled organism *Colpidium campylum* 89
Influence of silica upon tubercle bacillus 89
Activating substances in cultivation of tubercle bacillus .. 89
Growth of tubercle bacillus in human or rabbit citrated blood 151
Dissociation.
Variability of tubercle bacilli 204
Exotuberculin.
Exotuberculin in diagnosis 370, 371, 699
Avirulent tubercle bacilli and "exotuberculin Finzi" .. 370
Filtrable stage.
Immunization of guinea pigs by filtrable elements of tuberculosis 10
Tuberculous ultravirus 87, 314
Types of bacilli yielded by filtrable elements of tuberculous virus 456
Tuberculin reactions to tuberculous ultravirus infection . 476
Fractionation.
Fractionation of tubercle bacillus 761
Human type. See *M. tuberculosis* types.
Metabolism.
Gas metabolism of tubercle bacilli 314
Tuberculin.
Tuberculin allergy of guinea pig blood 115
Tuberculin allergy of human blood 115
Production of tuberculin in glycerin broth and Sauton's medium respectively 369
Comparison of Koch's old tuberculin with a new synthetic-medium tuberculin 641
Types (general).
The three types of tubercle bacilli 151
Typing tubercle bacilli by means of cultural method .. 8
Cultural and serological examination of type differentiation of tubercle bacilli 7
Types of tubercle bacilli in human tuberculosis 7
Transformation experiments with types of tubercle bacilli 8
Types (avian).
Life cycle of avian tubercle bacillus 201
Dissociation of avian tubercle bacilli 456, 497
Tuberculin reactions to avian type 476
Properties of S and R colonies of avian tubercle bacilli .. 526
Types (bovine).
Dissociation of bovine tubercle bacilli 456
Properties of S and R colonies of bovine tubercle bacilli .. 526
Egg yolk agar medium for isolation of bovine tubercle bacilius 699
Types (human).
Character of human strain isolated from blood 89
Cultural growth of human tubercle bacilli 412
Dissociation of colonies of human tubercle bacilli 456
Properties of S and R colonies of human tubercle bacilli .. 526
Viability.
Viability of bovine tubercle bacillus in dung and on pastures 79
Viability of tubercle bacilli in melted fat 698
Viability of *M. tuberculosis* in physiological saline 204
Virulence.
Effect of animal passage on virulence of tubercle bacilli .. 643

PAGE

M. TUBERCULOSIS INFECTION, GENERAL.
General.
Tuberculosis 39, 452
Tuberculosis of domestic animals 90
Arrest of Koch's bacillus in inflammatory foci in guinea pig .. 0
Tuberculosis in rabbits 208
Placental passage of *M. tuberculosis* 313
Report of Research Laboratory on tuberculosis at the Pasteur Institute 205
Effects of colloidal silica on experimental tuberculosis .. 497
Effect of normal mammalian lipids on experimental tuberculosis 497
Bacillaemia.
Bacillaemia in mice caused by avian type of *M. tuberculosis* 204
Tuberculous bacillaemia 314, 412
Analysis of Löwenstein's method 202
Diagnosis.
Sensitiveness to tuberculin in rabbits immunized with BCG 10
Finzi's anaesotuberculin 525
Allergy following injection of tubercle bacilli 569
Friedmann's remedy.
Results of enquiry on Friedmann's vaccine 699
Immunity.
Mechanism of immunity in tuberculosis 313
Agglutination of *Brucella melitensis* by sera of tuberculous persons 580
Testing of immunity conferred by BCG 10
Antigenic power of living and dead tubercle bacilli .. 153
Sensitivity of tuberculous guinea pigs to actinomyces extracts 256
Cellular reactions of tuberculosis 114
Activation of previous sites of reactions in tuberculous guinea pigs 369
Cytology of inflammatory exudate set up by intradermal injection of tuberculin 526
Demonstration of antibodies with suspension of tubercle bacilli 526
Tuberculous reinfection in guinea pig through lymphatic system 313
Nodules of experimental tuberculosis in guinea pig and relations to immunity 314
Immunization.
Variations in BCG organisms after peroral administration 153
Sensitiveness to tuberculin in rabbits immunized with BCG 10
Experimental vaccination against tuberculosis 699
Absorption of BCG by the intestinal mucous membrane .. 701
BCG vaccine, effect of inoculating in combination with diphtheria anatoxin 442
Spahlinger vaccine. See also *M. tuberculosis* infection in cattle, immunization.
Treatment of tuberculosis 154

M. TUBERCULOSIS INFECTION IN BIRDS.
Avian tuberculosis in Bulgaria 455
Porcine tuberculosis as indication of infection in poultry .. 92
Tubercle bacilli in hens' eggs 152
Cultivation of avian tubercle bacilli from faeces of tuberculous hens 201
Non-specific tuberculin reactions in fowls 756
Precipitation tests for avian tuberculosis 756
Eradicating tuberculosis from poultry 756

M. TUBERCULOSIS INFECTION IN CATTLE.
General. See also Avian type, Human type.
Primary uterine and vulvar tuberculosis in cow 91
Tuberculous endometritis 150
Atypical strain of bovine tubercle bacillus isolated from a buffalo 691
Tuberculosis of tonsils in cattle 310
Histopathological study of muscular tuberculosis in cow. 410
Schrön-Mircoli-Much granules in *M. tuberculosis* from bovine lesions 457
Ocular tuberculosis in cow 560
Recent research on bovine tuberculosis 642
Pathogenesis of tuberculosis in calf 696
Respiratory infection in tuberculosis in calves 697
Bovine tuberculosis problem and six year plan of eradication for England 150
Bovine tuberculosis in Great Britain in 1932 780
Bovine tuberculosis in Canada 780
Bovine tuberculosis in Ceylon 693
Bovine tuberculosis in Cochin-China 149
Bovine tuberculosis in Czechoslovakia 1921-1930 91
Bovine tuberculosis in Europe 375
Bovine tuberculosis in Fiji 11
Bovine tuberculosis in France 485
Bovine tuberculosis in Germany 704

PAGE

M. TUBERCULOSIS INFECTION IN CATTLE [cont'd].
Bovine tuberculosis in Holland 793
Bovine tuberculosis in India 400
Bovine tuberculosis in Mauritius 687
Tuberculosis research at Muktesar (India) 550
Bovine tuberculosis in New South Wales 552
Bovine tuberculosis in New Zealand 294
Bovine tuberculosis problem in South Africa 6
Bovine tuberculosis in Tanganyika Territory 296
Bovine tuberculosis in Turkey 259
Bovine tuberculosis in Uganda 685, 790
Bovine tuberculosis in U.S.A. 640, 689
Avian type.
Avian tubercle bacilli in cattle 201, 559
Avian tuberculosis as source of error in tuberculin tests on cattle 370
Transformation of avian into bovine tubercle bacilli .. 559
Control.
Eradication of bovine tuberculosis 310, 311, 498, 559
Control in dairy herds 7
Principles for control 559
Use of tuberculin in control of tuberculosis 369
Control of bovine tuberculosis in Belgium 559
Control of bovine tuberculosis in Czechoslovakia 696
Control of bovine tuberculosis in Denmark .. 478, 598, 696
Control of bovine tuberculosis in Saxony in 1932 149
Scheme for eradicating tuberculosis, Germany 454
Results of state campaign in Sweden 598
Control of bovine tuberculosis in Switzerland 454
Control of bovine tuberculosis in U.S.A. 150, 641
Diagnosis [general].
Comparison of diagnostic methods for bovine tuberculosis 90
Diagnosis by blood sedimentation test 527
Bronchial mucus collector for tuberculous cattle .. 137, 489
Nostril stoppers in tuberculosis diagnosis in cattle .. 489
Diagnosis [serological tests].
Sero-diagnosis of tuberculosis 170, 526
Serum flocculation reaction 760
Serological diagnosis of udder tuberculosis 371, 697
Diagnosis [ophthalmic test].
Diagnosis by new eye test 477
Diagnosis by "novophymatin-anergin" eye test 526
Diagnosis [tuberculin test, general].
Tuberculin 39, 43
Sources of error in 370
Dermal tuberculin test 43
Does tuberculin test indicate degree of infection? .. 170
Tuberculin reaction in infection by filtrable virus of tuberculosis 476
Data on value of tuberculins of the three bacterial types .. 476
Non-specific tuberculin reactions .. 441, 476, 755, 756
Comparison of standard and synthetic tuberculin 476
Diagnosis [intradermal tuberculin test]. See also Diagnosis, [tuberculin test, general].
Double intradermal test 43, 255, 476, 524, 755
An improved syringe for 681
An improved skin caliper for 681
Diagnosis [special tuberculins].
Synthetic tuberculin 476
Exotubercilin 370
Anaesotuberculin 525
Human type.
Tuberculin reactions in cattle due to human type of infection 171
Occurrence of *M. tuberculosis* infection (human type) in cattle 642
Immunization.
Tuberculosis control by immunization 313
BCG vaccination of cattle .. 312, 313, 413, 414, 560, 644
BCG vaccination of calves in Mauritius 687
Research on BCG in cattle in Canada 789
Vaccination by BCG in Belgium 700
BCG vaccination of guinea pigs 644
BCG vaccination of sheep 644
Trials with Spahlinger vaccine on cattle 560
Udder.
Udder tuberculosis 411
Udder tuberculosis in Sweden 451
Serological diagnosis of udder tuberculosis 371, 697
Biological tests of milk 481
Excretion of *M. tuberculosis* in milk of cow with an apparently normal udder 481
Tuberculous infection in milk 535, 582, 672
Tuberculous infection in milk. Report by Department of Health for Scotland 482

PAGE

Tuberculous infection in milk in Warsaw 484
Demonstration of tuberculous antibodies in milk by complement-fixation 663
Origin and prevention of udder tuberculosis 6
Cell picture of milk in tuberculous mastitis 305
M. TUBERCULOSIS INFECTION IN DOGS.
Tuberculosis of lymph glands of dog 644
Exotubercilin in diagnosis of canine tuberculosis 699
M. TUBERCULOSIS INFECTION IN HORSES.
Tuberculosis of horse 454, 530
Tuberculous neuritis of sciatic nerves of horse 118
M. TUBERCULOSIS INFECTION IN MAN.
Infection with avian type.
Avian tuberculosis in man 698
Tuberculosis of avian type in man in Denmark 152
Infection with bovine type.
Tuberculosis of bovine type in man 7, 92, 153
Tuberculosis of bovine type in man in Denmark 152
Human and bovine infections in man 201
M. TUBERCULOSIS INFECTION IN SWINE.
General.
Porcine tuberculosis in England 669
Tuberculosis of swine in Philippine Islands 697
Porcine tuberculosis as indication of infection in poultry .. 92
Method of dissemination of tuberculosis in swine 455
Types of *M. tuberculosis* of swine in Finland 643
Intestinal tuberculosis in swine 698
Avian type.
Avian tuberculosis in swine 92, 697, 698
Avian tuberculosis in swine in Finland 643
Control.
Control of porcine tuberculosis in Denmark 598
Eradicating tuberculosis from swine 756
Diagnosis.
Intradermal tuberculin test in swine 172, 669
M. TUBERCULOSIS INFECTION IN WILD ANIMALS.
Tuberculosis of bear 530
Tuberculosis in ape and wild deer 48
MYCOLOGY. See Fungi.
MYCOSIS. See Fungi.
MYCOTIC DERMATITIS. See Dermatitis, mycotic.
MYELOMATOSIS, AVIAN. See Leucosis, avian.
MYIASIS. See Blowflies.
MYOGLOBINURIA, GENERAL.
Atypical enzootic myoglobinuria 260
MYGLOBINURIA PARALYTICA, EQUINE.
Myoglobinuria in domestic animals 667
Influence of ergotamine on blood sugar picture in myoglobinuria paralytica 445
Investigations on blood of horses affected with myoglobinuria 667
Heterohaemotherapy in equine myoglobinuria 667

N

"NAGANOL."
"Naganol" against dourine in donkey stallions 486
Treatment of camel trypanosomiasis with "naganol" .. 591
"Naganol" for treatment of surra in camels 759
NAIROBI SHEEP DISEASE.
Control of Nairobi sheep disease in East Africa 685
Nairobi sheep disease in Kenya colony 144, 493
Nairobi sheep disease in Uganda 791
NANOPHYETUS.
Pathogenicity of *N. salmincola*, Chapin, for fish hosts .. 38
NARCOSIS. See Anaesthesia.
NASAL GRANULOMA. See Granuloma.
NATIONAL RESEARCH COUNCIL [CANADA]. See Councils.
NATIONAL RESEARCH COUNCIL [U.S.A.] See Councils.
NECROBACILLUS. See *Actinomyces necrophorus*.
NECROSIS, FAT. See Fat necrosis.
NEMATODES, GENERAL. See also *Aelurostrongylus, Ancylostoma*, Ascarids, *Bunostomum, Capillaria, Dictyocaulus, Dioctophyme, Dirofilaria, Filaria, Filarioidea, Gorgulonema, Habronema, Haemonchus, Heterakis*, Hookworms, Lungworms, *Nematodirus, Oesophagostomum, Onchocerca, Osleroides, Ostertagia, Setaria, Stephanofilaria*, Strongyles, *Syngamus, Thelazia, Trichinella, Trichostrongylus, Uncinaria*.
Effect of nematode infestations on metabolism of the host .. 748
"Ascaridol" (Bayer) as treatment for roundworms in small animals 773
Parasitic nematodes from North China 113
Report on nematodes from the Federated Malay States .. 748
Gastro-intestinal nematodes of sheep in Finland 663

PAGE

NEMATODES, GENERAL [cont'd].
Two unrecorded nematodes from abomasum of cattle in India 250
Nematodes parasitic in goats at Muktesar 250
NEMATODIRUS.
Seasonal fluctuation in number of eggs of *Nematodirus* sp. in faeces 436
"NEMURAL."
"Nemural" as treatment for tapeworms in small animals .. 773
NEOPLASMS, GENERAL. See also Haemangioma, Lymphoma, Melanoma, Papilloma.
Neoplastic transformation of both kidneys in a pig 530
Ocular cancer of cattle in Uruguay 532
The origin of cancer 596
Basal cell cancer of skin of dogs and cats 624
Transmissible tumours of the fowl 671
Nasal tumours in horses and cattle 766
NEOSALVARSAN.
Treatment of bovine contagious pleuro-pneumonia with neosalvarsan 126
Influence of neosalvarsan on blood picture and rate of sedimentation of corpuscles in horse 56
NERVE BLOCKING. See Anaesthesia.
NERVOUS SYSTEM. See also Neuritis, Paralysis.
Immunity and nervous system 254
Influence of the nervous system on immunity 558
Neuromuscular excitability in relation to bio-chemistry of minerals 279, 280
Histological changes of nervous system in swine influenza .. 573
NEURITIS.
Tuberculous neuritis in a horse 118
NEURO-LYMPHOMATOSIS GALLINARUM. See Fowl paralysis.
NEW-BORN, DISEASES OF. See also "Joint ill."
Infections of foetuses and foals 120, 174
Irradiated ergosterol in treatment of septicaemia in new-born and diarrhoea of young animals 276
Br. abortus infection as predisposing factor to diseases of the new-born 418
NEW SOUTH WALES. See Australia.
NEW ZEALAND. See also Abortion, general, Blackleg, "Circling disease" of sheep, *Corynebacterium pseudotuberculosis ovis*, Deficiency diseases, *Echinococcus*, Foot rot, Iodine, Keds, Mastitis, general, Milk fever, *Mycobacterium paratuberculosis* infection, *Mycobact. tuberculosis* infection in cattle, general, Paralysis, general, Pregnancy disease of ewes, Pulpy kidney disease, Reports, Sterility, Streptococcal mastitis, Teeth, Tetany, Wool.
Some ailments of sheep in New Zealand 47
Diseases of livestock in New Zealand 78, 294, 295, 449
NEWCASTLE DISEASE.
Newcastle disease. Immunization 107
Second outbreak of pseudo poultry plague, Victoria 239
An atypical form of fowl plague 470
Cross-immunity test with Korea fowl disease and Japanese fowl plague and comparison with Newcastle disease .. 519
Newcastle disease in Egypt 574
Differentiation of fowl plague and Newcastle disease .. 574
NICOTINE SULPHATE.
Nicotine sulphate as vermifuge for ascarids of poultry .. 773
Nicotine sulphate against sheep stomach worm 676
NIGERIA. See also Ascarids, Babesia infection, ovine, *Bacillus anthracis* infection, general, *Demodex*, Foot and mouth disease, general, Goat pox, Heartwater, Helminth parasites, general, *Pasteurella boviseptica* infection, Pleuro-pneumonia, contagious bovine, immunization, Reports, Rinderpest, Skin, diseases, *Streptothrix*, *Trypanosoma*, general, Trypanosoma infection, general.
Diseases of livestock in Nigeria 73, 74, 138, 139, 140, 141, 142
NITRIC ACID.
Disinfection of sheep pox virus by nitric acid 584
NOMENCLATURE.
Standard classified nomenclature of disease 637
Nomenclature of oestral disorders 680
NON-SPECIFIC STIMULATION THERAPY.
Increase in antibody formation by non-specific stimulation therapy 764
NORTH AFRICA. See Babesia infection, bovine, *Theileria*.
NORTHERN RHODESIA. See also Poisoning, poisonous plants, Rabies, control, Reports.
Livestock diseases in Northern Rhodesia 191
NORTHERN ZULULAND. See Union of South Africa.
NORWAY. See *Brucella abortus* infection in cattle, general, Paratyphoid group infection.
NOTIFIABLE DISEASES.
Notifiable diseases in Germany 794, 795

PAGE

NOTOCOTYLUS.
Monostomial trematodes of genus *Notocotylus* 472
"NOVARSENOBILLON."
Treatment of anaplasmosis with "novarsenobillon" 715
NOVY'S BACILLUS. See *Clostridium oedematiens*.
NUCLEAR INCLUSIONS. See Inclusion bodies.
NUTRITION. See also Deficiency diseases, Grain, Licks, Milk, Minerals, Vitamins.
Importance of nutrition in diseases of livestock 121
Animal nutrition research in Tanganyika 288
Feeding value of natural pastures in Union of South Africa .. 289
Need for research in animal nutrition in tropics 186
Saponin as supplement to pig feeds 395
Relation of nutrition to bovine contagious abortion 14
Relation between faulty winter feeding of ewes and susceptibility of their lambs to pulpy kidney 581
Deforming leg weakness in chickens 382
Effect of fluorine on nutrition of swine 389
Nutritional laminitis in horses 625
Nutritional factors affecting resistance to heiminthiasis 524, 751
NUTRITIONAL LAMINITIS. See Laminitis.
NUTTALIA. See *Babesia*.
NYASALAND. See also Census, *Psoroptes*, Reports, *Theileria parva* infection, Trypanosoma infection, general.
Diseases of livestock in Nyasaland Protectorate 450

O

OAK BUD POISONING.
Oak bud poisoning in cattle 446
OBSTETRICS.
Obstetrics for cattle and horses 194
Obstetrics in the horse 796
OEDEMA, MALIGNANT. See *Clostridium oedematiens* infection.
OESOPHAGOSTOMUM.
O. radiatum 523
Chemotherapy of oesophagostomiasis in sheep 674
OESTRIDAE.
Life cycle of *Oestrus ovis* 109
The ox warble fly 740
Morphology of eggs of *Gastrophilus* 471
Life history of *Gastrophilus* larvae of horse 38, 360
Nasal bots in roe-deer and stags 48
Hypoderma diana in roe-deer 48
Control of ox warble fly in Austria 433
Control of ox warbles in Denmark 740
Dermatobia hominis in animals in Panama 741
O. ovis in sheep in Tanganyika Territory 297
Losses by anaphylaxis in warble fly control 739
Anaphylaxis in cattle with extract of *Hypoderma* larvae .. 739
Control of warble fly 244, 433, 738
Destruction of warble fly larvae by chemical preparations and by derris 245, 542, 738, 739, 774
OESTRUM. See also Sex hormones.
Aetiology and nomenclature of oestral disorders 680
Oestrum in bitch 680
Pituitary body and oestrus cycle 680
Length of oestrus cycle 393
Sexual cycle in horses and cows 66
Oestral mucus tests in mare 680
Prolan treatment of anoestrum 488
Oestrum-producing hormone international standard 281
Effect of oestrogenic hormone on capons 679
Oestrogenic substance from plant material 281
Oestrogenic hormones 680
OESTRUS OVIS. See Oestridae.
ONCHOCERCA.
Cervical onchocercosis in dromedary 364
Development of *O. cervicalis* in *Culicoides nubeculosis* .. 472
O. cervicalis in fistulous withers and poll evil 472
OPHTHALMIA, CONTAGIOUS.
Pink-eye in sheep 581
Contagious ophthalmia in cattle in Southern Rhodesia .. 555
OPHTHALMIC TEST. See Tests, ophthalmic.
OPISTHORCHIS.
Malformation in *O. felineus*, parasite of cat 745
Action of antimony preparations on opisthorchiasis in cat .. 386
Action of catechol sodium disulphonate on *O. felineus* .. 386
OPSONIN.
Reticulo-endothelial system and source of opsonin 64
ORNITHODORUS.
The ground tick, *O. rostratus* 741
ORTHOPHENYLPHENOL.
Orthopheny!phenol as parasiticide for dogs 675

PAGE

OSLEROIDES.
O. massino, new nematode from lung of cat 754
OSTEITIS.
Osteitis in poultry caused by mineral deficiency 177
OSTEO-ARTHRITIS.
Osteo-arthritic problem in horse 375
Osteo-arthritis in small ruminants 480
OSTEODYSTROPHIA FIBROSA.
Influence of muscular fatigue and acidogenetic factor on aetiopathogenesis of "pitirosi" 380
"Pitirosi" (osteoporosis) in equines 440
Shifting lameness in horses 531
OSTEOMYELITIS BACILLOSA.
Osteomyelitis bacillosa bubalorum in the Dutch East Indies 216
OSTEOPOROSIS. See Osteodystrophia fibrosa.
OSTERTAGIA.
Method of establishing pure *Ostertagia* infestations in sheep 619
Life history of *O. circumcincta* 751
OVARY.
Effect on male animals of feeding with ovarian tissue .. 67
Weight, size and shape of ovaries in cows 281, 781
Ovariotomy on thyro-parathyroidectomized animals 282
Ovarian tissue in bisexual pigs 531
Physiological atresia of ovarian follicles and interstitial cells 548
Regeneration of testis in place of removed ovary in guinea fowl 632
OVULATION.
Ovulation without "heat" in ewe 282
OWLS. See Eimeria infection, avian.
OX WARBLE FLY. See Oestridae.
OXEN. See Cattle.
"OXYCHINOL."
Corrosive action of "oxychinol" on metals 541
OXYGEN. See *Mycobacterium tuberculosis*, metabolism.

P

PALESTINE. See *Echinococcus*, Helminth parasites, general, Helminth parasites general, cat parasites, Helminth parasites general, dog parasites, *Trichinella*.
PANAMA. See Oestridae, Trypanosoma infection general, *Trup. hippicum*.
"PANSERAPIS."
"Panserapis" capsules as anthelmintic for horse 59
PAPILLOMA.
Vaccination against papillomata in cattle 671
PARABLACKLEG BACILLI. See *Clostridium septique*.
PARAGUAY. See Mal de caderas, bovine, non-trypanosome.
PARALYSIS, GENERAL. See also Fowl paralysis, "Kumri."
Ante-partum paraplegia in cow 49
Ante-partum paralysis of cows in New Zealand 295
Bulbar paralysis in bull in Fiji 479
Partial paraplegia in horses 375
Equine paraplegia in India 551
PARALYSIS OF PREGNANT EWES. See Pregnancy disease of ewes.
PARAMETORCHIS.
P. manitobensis n.sp. in Northern Manitoba sledge dogs .. 662
PARASITES OF PARASITES. See *Brachymeria*.
PARASITIC INFESTATION, GENERAL. See also Entomology, Helminth parasites, general.
Parasitology in medical curriculum 108
Importance of host to its parasites 245
Parasitic diseases common to man and animals 742
Intestinal parasites in fur-bearing animals 168
Parasitic diseases of horses 367
Internal parasites of pigs 110
Treatment for internal and external parasites 675
Animal parasite investigations in U.S.A. 660
Ecto- and endoparasites in Uganda 791
PARATYPHOID GROUP OF BACTERIA. See also *Bacterium aertrycke* infection, *Bact. pullorum* infection, Food poisoning.
Cataphoresis of bacteria of paratyphoid group 13
Salmonella agglutination and related phenomena 172
Gastro-intestinal irritant produced by bacilli of salmonella group 415
Typhoid-paratyphoid bacteria in dust of railway wagons used for meat 461
Disinfection test of railway wagons using paratyphoid bacteria 487
PARATYPHOID GROUP INFECTION.
Cats and dogs.
Paratyphoid group bacteria in dogs and cats 708
Horses.
Abortion in horses due to paratyphoid infection 703
Pigeons.
Pigeon paratyphoid 12, 210

PAGE

Swine.
Swine paratyphoid 13, 231, 319, 320, 461, 727
Paratyphoid bacteria in bile of pigs 460
Blood picture of pigs affected with paratyphoid 428
Value of swine paratyphoid vaccine 762
Turkeys.
Endemic paratyphoid infection in turkeys 317, 415
PARROTLETS. See Psittacosis.
PARROTS. See Psittacosis.
PARTRIDGES. See Fowl pox.
PARTURITION.
Effect of parturition on blood and urinary constituents in ewe 586
Mineral content of blood of cows at calving 768
Blood picture of cattle and dogs at parturition 768
PASTEURELLA INFECTION, GENERAL.
Haemorrhagic septicaemia in deer, rabbits and wild fowl .. 48
Haemorrhagic septicaemia in Europe 375
Salicylated vaccines against pasteurella infection 645
P. AVISEPTICA INFECTION.
Fowl cholera in Eritrea 479
Fowl cholera in Turkey 259
Study in *P. avicida* antigens for producing fowl cholera vaccine 318
Attenuated vaccine immunization 561
P. BOVISEPTICA INFECTION.
In buffaloes in Turkey 259
In cattle in Kenya 493, 635
In cattle in Nigeria 73, 139
In cattle in Burma 190
In cattle in Ceylon 191, 593
In cattle in Dutch East Indies 645
Control by vaccination in Nigeria 74
Immunization of buffaloes 98, 208
Disinfection of infected cattle trucks 487
P. PSEUDOTUBERCULOSIS INFECTION.
P. pseudotuberculosis infection of animals 209
Infection in game animals 48
Infection of cats 93
Infection in fowl and pheasant 318
Intradermal reaction in guinea pig infection 93
P. SUISEPTICA INFECTION.
Swine plague 317, 318, 727
Wild coloured domestic pig immune to infection 208
Blood picture of pigs affected with *P. suiseptica* 428
P. TULARENSIS INFECTION.
Dermacentor variabilis as host of *P. tularensis* 618
PASTEURIZATION. See Milk, pasteurization.
PASTURES.
Mineral content and feeding value of pastures in Union of South Africa 289
Dairy pastures of Australia 634
PEACOCKS. See Eimeria infection, avian.
"PEG-LEG."
"Peg-leg" in cattle 260
PELVIS.
Dimensions of pelvis in sows 280
PERISTOMATITIS.
Biology of virus of ovine and caprine peristomatitis .. 469, 732
PERITONEUM. See *Trypanosoma rabinowitchi*.
PERMEABILITY OF TISSUES. See Tissues.
"PERNOCTON."
"Pernocton" 586
PEROMYSCUS. See Mice.
PEROSIS. See Leg weakness.
PERSONALITIES. See van Leeuwenhoek, Anthony.
PERSPIRATION. See "Dry coat" in horses.
PFEIFFERELLA MALLEI.
Pf. mallei on ox bile media 458
PF. MALLEI INFECTION.
Glanders in Europe 375
Glanders in Turkey 259
Vernes sero-reaction in 458
Professor Panek's method for diagnosis 622
Bacteriology of glanders and prophylaxis 415
Mallein test.
Standardization of mallein 458
Double mallein test in ponies 551
Blood picture under intradermopalpebral test 622
PF. PSEUDOMALLEI
Comparative study of *Pf. pseudomallei* and *Pseudomonas pyocanea* 208
PHARMACOLOGY. See Therapeutics.
PHARYNX.
Lymphoid tissue of pharynx of domesticated animals 628
PHEASANTS. See *Pasteurella pseudotuberculosis* infection.

PAGE

PHENOL.
Determination of phenol coefficient of disinfectants by cover-slip method 676
PHENOMENA. See Arthus' phenomenon, Shwartzman's phenomenon.
PHENYL-MERCURIC COMPOUNDS.
Phenyl-mercuric-nitrate 57, 486
Action on animals and preservative values 445
PHILIPPINE ISLANDS. See Foot and mouth disease, general, Helminth parasites general, general, *Mycobacterium tuberculosis* infection in swine.
PHLEBOTOMUS.
P. macedonicus in Hungary 576
P. perniciosus in Algeria 576
PHOSPHORUS.
Deficiency.
Diseases of cattle in Sweden 263
Phosphorus deficiency and sterility of cattle 382
Metabolism.
Phosphorus for domesticated ruminants 382
Phosphorus in nutrition of sheep 68
Phosphorus in saliva of sheep 545
Renal excretion of inorganic phosphates in sheep 545
Influence of phosphorus on wool growth 69
Calcium phosphates in domestic animal feeding 68
Phosphorus of blood of cows at calving and of calf .. 768
Structure of cattle bone altered by feeding on rations low in phosphorus 382
Phosphorus content of blood serum in fasting animals after intravenous injection of phosphorus and after bleeding 68
Poisoning.
Phosphorus poisoning in poultry 626
PHOTOGRAPHY. See Infra-red photography.
PHOTOSENSITIZATION
Photosensitization of animals in South Africa 677
PHYSIOLOGY, GENERAL. See also Alimentary tract, Amnion, Blood, Endocrine glands, Gall bladder, Gastric juice, Genital system, Kidneys, Lactation, Lymphatic system, Metabolism, Nervous system, Nutrition, Oestrum, Ovulation, Parturition, Pharynx, Placenta, Pregnancy, Reticulo-endothelial system, Rumination, Salivary secretions, Urine, Uterus, Water in tissues.
Physiology of domestic animals 557
Feeding male animals with ovarian tissue 67
Chemical composition of crop secretion of pigeon 69
Size of animals and utilization of food 187
Integrative functions of cerebral cortex 184
Production tests on cattle 187
Nervous control of abdominal blood vessels and viscera .. 278
PIGEON POX.
Atypical forms of pigeon pox 734
Immunity tests in pigeon pox 734
Relative efficacy of pigeon pox and fowl pox vaccines .. 356
PIGEON TYPHOID. See *Bacterium aertrycke* infection.
PIGEONS. See also *Bacterium aertrycke* infection, Helminth parasites general, bird parasites, Paratyphoid group infection, Pigeon pox, Sunstroke, *Trichomonas*.
Composition of crop secretion of pigeon 69
PIGLETS. See Skin, diseases.
PIGS. See Swine.
PINK-EYE IN SHEEP. See Ophthalmia, contagious.
PIPETTES.
Apparatus for pipetting serum 500
"PIROBLUE."
Equine piroplasmosis and "piroblue" 609
PIROPLASMA. See *Babesia*.
"PITIROSI." See Osteodystrophia fibrosa.
PITUITARY.
The hypophysis cerebri of cattle 632
Adrenotropic hormone of anterior pituitary lobe 393
Gonadotropic substances of pituitary 632
Pituitary body and oestrus cycle 680
PITUITRIN.
Treatment of agalactia in sows with pituitrin 387
PLACENTA. See also Amnion.
Physiology of placenta 65, 631
Human and comparative placentation 65
Antibodies in placental extracts 256
Placental passage of *Mycobacterium tuberculosis* 313
PLANTS. See Poisoning, poisonous plants.
"PLASMOCHIN." See "Plasmoquine."
PLASMODIUM INFECTION.
General.
Is malaria parasite filtrable? 222

PAGE

Animal barrier in malaria control 339
Reticulo-endothelial system in malaria 716
Henry's serum flocculation reaction in malaria .. 22, 664
Prophylaxis by "plasmoquine" and "atebrin" 180
Avian malaria.
Avian malaria in Ceylon 594
Attempts to filter bird malaria virus 162
Bleeding time in canaries in malaria 60
Electric charge of erythrocytes in bird malaria 162
Quinine and "plasmoquine" therapy in bird malaria 60, 776
Monkey malaria.
Plasmodium of lower monkeys of Africa 222
"PLASMOQUINE."
"Plasmoquine" in malaria 60, 180, 776
PLEURO-PNEUMONIA, CONTAGIOUS BOVINE.
General.
In Europe 375
In Australia 552, 554
In Belgian Congo 725
In Gold Coast Colony 75, 792
In Kenya Colony 142, 493, 635
In Nigeria 73, 138
In the Sudan 590
In Tanganyika Territory 296
Control.
Control by culture vaccines 31
Control in East Africa 685
Immunization.
Vaccination in Nigeria 74
Immunity to bovine contagious pleuro-pneumonia .. 512
Treatment.
Treatment with neosalvarsan 126
Virus.
Growth phases of pleuro-pneumonia in liquid and solid media 725
PLEURO-PNEUMONIA, CONTAGIOUS CAPRINE.
In Greece 379
In Turkey 259
In Ceylon 594
In Gold Coast Colony 75
In Kenya Colony 144
In Tanganyika Territory 296
PLEURO-PNEUMONIA, OVINE.
In the Gold Coast 75
PNEUMONIA.
Similarity of virus pneumonia in animals to broncho-pneumonia in man 358
Mycotic pneumonia in deer and hares 48
Infectious calf pneumonia 207
Septic pneumonia of calves in India 401
POISONING. See also Food Poisoning.
General. See also Doping, Carbon tetrachloride, Copper sulphate, Cyanide poisoning, "Darmous," Fluorine, Gases, poisonous, Grain, Mercury, Phosphorus, Sewage poisoning, Sodium arsenite.
Is powdered glass "poisonous" to animals? 262
Chemical examination of organs suspected of poisoning .. 272
An analyst's jottings on poisons 626
Poisonous plants. See also Acorn poisoning, *Aplopappus heterophyllus*, *Baileya multiradiata*, Beetroot poisoning, Cassava poisoning, *Chrysocoma tenuifolia*, Clover, Corn cockle, *Eupatorium urticaefolium*, *Kalmia microphylla*, Lantana, *Lopholaena coriifolia*, Lupins, *Mercurialis annua*, Oak bud poisoning, *Psilocaulon*, *Ranunculus*, Rhubarb, *Sorghum*, *Tribulus*, Vetch.
Poisonous plants 447, 539, 689
Diagnosis, treatment and prevention of plant poisoning .. 584
Eradication of plants poisonous to livestock 539
Poisonous plants of Argentine Republic 584
Plant poisoning in cattle and sheep in Northern Rhodesia 62
Poisonous plants in South Africa 61, 79, 595
Poisonous plants in Uganda 791
POISONING, FOOD. See Food poisoning.
POLAND. See *Bacillus anthracis* infection, general, Milk, bacterial content.
POLIOMYELITIS.
Immunological relation of poliomyelitis to "louping ill" .. 350
Immunization of sheep to poliomyelitis virus 730
POLL EVIL.
Onchocerca cervicalis in poll evil 472
POLYPUS.
Bronchial polypus in dog 530
POLYSACCHARIDES.
Specific polysaccharides of anthrax bacilli 87

PAGE

POMERANIA. See Germany.
PONIES. See Horses.
POST-MORTEM TECHNIQUE.
Post-mortem dissection of domestic animals 195
POULTRY, GENERAL. See also Ducks, Fowls, Geese, Turkeys.
Poultry diseases 84
Report of committee on diseases of poultry (Amer. Vet. Med. Ass.) 260, 436
Poultry diseases in New York City 436
Poultry diseases in East Africa 685
Poultry diseases in New South Wales 553
PRECIPITIN TEST. See Tests, serological [precipitin].
PREGNANCY.
Electrolyte content in blood serum of sheep, goats and cows in pregnancy 285
Pregnancy changes in uterus of cow 392
Blood picture of cattle and dogs during pregnancy 768
Gonadotropic hormone in pregnant mare's serum 548
Duration of pregnancy in ewes 393
Effect of pregnancy on blood and urinary constituents in the ewe 586
Excretion of sexual hormone in urine and blood of pregnant sows 679
Mucous changes in rat's vagina during pregnancy 67
Gestation in rabbit 281
Diagnosis.
Diagnosis of pregnancy in cattle 282, 393
Hormonal diagnosis of pregnancy 181, 282
Hormonal diagnosis of pregnancy in cattle 783
Hormonal pregnancy diagnosis in sheep 783
Hormonal pregnancy diagnosis in mares 70, 182, 283, 548, 782
PREGNANCY DISEASE OF EWES.
Pathology of pregnancy disease of ewes 582
Pregnancy disease of ewes in New Zealand .. 78, 264, 449
PREISZ-NOCARD BACILLUS. See *Corynebacterium pseudotuberculosis ovis.*
PREPUCE.
Inflammation of prepuce in bulls as cause of impotence .. 670
PRESERVATIVES. See Brilliant green.
PROCYONLOTOR. See Raccoons.
"PROLAN."
"Prolan" treatment of anoestrum 488
PROSTHOGONIMUS.
Biology of *P. pellucidus* in ducks and geese 745
PROTOZOA, GENERAL. See also *Aegyptianella pullorum, Anaplasma, Babesia, Balantidium, Colpidium, Eimeria, Endamoeba, Globidium, Grahamella, Haemogregarina, Haemoproteus, Histomonas, Infusoria, Leishmania, Leptospira, Leucocytozoon, Plasmodium, Sarcosporidia, Spirochaeta, Theileria, Toxoplasma, Trichomonas, "Tristeza", Trypanosoma.*
Blood parasites of Zebu 506
Ciliates in rumen of cows 229
Mobilization of haematozoa in peripheral circulation under influence of adrenaline 231
Protozoan diseases in South Africa 79
Blood parasites of game in Africa 570, 713
Protozoan diseases in livestock in Gold Coast Colony .. 76
Protozoan parasites in animals in Dutch East Indies .. 691
Staining of blood and blood parasites 396, 682
PROVENTRICULITIS.
Proventriculitis in chickens due to flukes 745
PRUSSIC ACID. See Hydrocyanic acid.
PSEUDO FOWL PLAGUE. See Newcastle disease.
PSEUDOMONAS PYOCYANEA.
Comparative study of *Pfeifferella pseudomallei* and *P. pyocyanea* 208
PSEUDOMORPHINE.
Actions of pseudomorphine 276
PSEUDORABIES. See Aujeszky's disease.
PSEUDOTUBERCULOSIS. See *Corynebacterium pseudotuberculosis ovis* infection, *Pasteurella pseudotuberculosis.*
PSILOCAULON.
P. absimile as a poisonous plant 584
PSILOSTOMUM.
Proventriculitis in chickens due to *P. ondatrae* 745
PSITTACOSIS.
Pathology of psittacosis in man and animals 357
Infectiousness of psittacosis 166
Immunological studies with psittacosis 165
Developmental forms of psittacosis virus 471
Psittacosis in parrots 357
Psittacosis in California 736
Psittacosis in South American parrotlets and conures .. 736
Psittacosis in native Australian budgerigars 736
SPOROPTES.
Sheep scab in Great Britain in 1932 189
Sheep scab in Nyasaland Protectorate 450
Sheep scab in Southern Rhodesia 555
Sheep scab in U.S.A. 689
Treatment of sheep scab 478
PUBLIC HEALTH. See also Abattoirs, Eggs, Food poisoning, Food hygiene, Meat products, Milk, Refrigeration, Slaughter.
Sanitary Inspector's handbook 82
PULLORUM DISEASE. See *Bacterium pullorum* infection.
PULPY KIDNEY DISEASE.
Pulpy kidney disease of lambs 16, 333
Pulpy kidney disease of sheep in New Zealand .. 295, 449
Faulty winter feeding of ewes and susceptibility of their lambs to pulpy kidney disease 581
PURPURA HAEMORRHAGICA.
Treatment of horse with specific serum 667
PUSTULAR DERMATITIS, CONTAGIOUS. See Dermatitis pustular.
PYRETHRUM.
Pyrethrum for winter control of lice and ticks 774

Q

QUININE.
Quinine therapy in infections with *Plasmodium circumflexum* 776

R

RABBITS.
Bacterial diseases. See *Bacillus anthracis* infection, immunization, Bacteria general, toxins, *Mycobacterium tuberculosis* infection general, Pasteurella infection, *Staphylococcus.*
Diseases general. See Sunstroke.
Metazoan parasites. See *Ixodes.*
Physiology. See Pregnancy.
Protozoan diseases. See Eimeria infection, general.
Virus diseases. See Aujeszky's disease, Encephalitis, Lymphogranuloma inguinale, Stomatitis.
RABIES. See also Mal de caderas bovine, non-trypanosome.
General.
In Europe 375, 730
In Germany 730, 795
In Turkey 259
In Ceylon 191, 594
In Malaya 789
In French West Africa 236
In Kenya 493, 635
In South Africa in 1932 517
In Sudan 591
In Tanganyika Territory 296
Morphological studies on rabies. Salivary glands .. 656
Dilatation of gall-bladder in canine rabies 657
Control.
Control of rabies 478
Control of rabies in East Africa 684
Control of rabies in Northern Rhodesia 191
Diagnosis.
Clinical diagnosis of rabies 34
Diagnosis by intracaudal inoculation in mice 657
Immunization.
Immunization against rabies 658
Vaccination against rabies in Morocco in 1932 468
Rabies virus in brain after vaccination 34
Immunizing value of different strains of fixed virus .. 656
Sequelae of antirabic vaccination 236, 349
Trinidad and South American Virus. See also Mal de caderas, bovine, non-trypanosome.
Human rabies in Trinidad and its relation to classical strain 33
Rabies in cattle in British Guiana 687
Rabies in cattle, horses and mules in South America .. 33
Virus.
Antigenic properties of rabies virus 236
Photodynamic action of methylene blue on fixed virus .. 656
Transformation of fixed into street rabies virus 730
RACHITIS. See Rickets.
RACCOONS. See Eimeria infection, general.
RADIOLOGY. See also Ultra-violet rays.
Bacteriology, immunobiology and cosmic rays 663
RAILLIETINA.
Life cycle of *R. cesticillus* 746

PAGE

RAMS. See Sheep.
RANGE PARALYSIS. See Fowl paralysis.
RANUNCULUS.
Toxicity of *Ranunculus* spp. for animals 447
RATS. See Eimeria infection, general, Fowl plague, Light, Pregnancy, Sunstroke, *Trichinella*, general, *Trypanosoma brucei*, *Tryp. equiperdum*, *Tryp. lewisi*, *Tryp. rabinowitchi*.
REACTIONS. See Tests.
"REDWATER." See Babesia infection, Haematuria, Haemoglobinuria.
REFRIGERATION.
Microbiology of frozen foods 215
Effects of freezing on spores and toxin of *Clostridium botulinum* 215
Refrigerating industry in France 384
REGULATIONS. See Law.
REPELLANTS. See Gordura grass.
REPORTS.
Australia.
Department of Agriculture, New South Wales: livestock diseases report for year ended 30th June, 1932 552
Department of Agriculture and Stock, Queensland: report for 1932-33 553
British Guiana.
Department of Agriculture: report of livestock division for 1932 686
Burma.
Report on Veterinary Department for year ending 31st March, 1932 190
Canada.
16th annual report of National Research Council 788
Ceylon.
Administration report of Government Veterinary Surgeon 1932, 1933 .. .. 191, 592
Dutch East Indies.
Buitenzorg, Java: report of Veterinary Institute for 1932 691
Federated Malay States.
Annual report of Veterinary Department for 1932 .. 789
Fiji.
Report by Chief Veterinary Officer, 1931, 1932 .. 76, 77
France.
Report of Research Laboratory on Tuberculosis, Pasteur Institute 205
Germany.
Hanover: annual report on veterinary bacteriological examination of milk, 1932 267
Incidence of animal diseases and abattoir returns for 1932 794
Gold Coast Colony.
Report on Department of Animal Health, 1931-32, 1932-33, 1933-34 .. .. 74, 75, 792
Great Britain.
Ministry of Agriculture and Fisheries: report of proceedings under Diseases of Animals Acts for 1932 .. 188
Cumberland County Council: report of County Veterinary Officer for 1932 192
Durham County Council: report of Chief Veterinary Officer for 1932 192
City of Edinburgh: report of Veterinary Department for 1932 299
City of Liverpool: report of Chief Veterinary Officer for 1932 298
Department of Health, Scotland: report on tuberculous infection in milk 535
Hannah Dairy Research Institute, Scotland: report for year ending 31st March, 1933 298
Report of Veterinary Advisor, South Eastern Agricultural College, Wye, Kent.. 451
University of Reading: report of National Institute for Research in Dairying for year ending 31st July, 1932 .. 78
Holland.
Friesland: 14th report of Health Service for Livestock, 1932-33 300
Imperial Serum Institute: report for 1932.. 690
Veterinary Service: report for 1932 793
India.
Imperial Institute of Veterinary Research, Muktesar: reports for years ending 31st March, 1932, and 1933 399, 550
Mysore Serum Institute: administration report for 1932-33 494
Irish Free State.
Report of Minister of Agriculture 1932-33.. 686
Veterinary College of Ireland: report for 1932-33 .. 686
Jamaica.
Department of Agriculture: report for 1932 450

PAGE

Kenya Colony & Protectorate.
Report of Deputy Director (Animal Industry) and Chief Veterinary Officer for 1931, 1932 .. .. 142, 634
Report of Chief Veterinary Research Officer for 1931, 1932 143, 491
Malaya. See Reports, Federated Malay States, Reports, Straits Settlements.
Mauritius.
Report of Veterinary Division for 1932 687
Morocco.
Research laboratory of T.O.M.: report for 1932 193
Research laboratory of livestock service: report for 1932 193
New Zealand.
Department of Agriculture: reports for 1931-32, 1932-33 .. .. 294, 449
Canterbury Agricultural College: report of veterinary section, 1932 78
Nigeria.
Veterinary Department: report for 1931, 1932 .. 73, 138
Report of Veterinary Pathologist for 1931, 1932 .. 74, 140
Northern Rhodesia.
Department of Animal Health: report for 1932 191
Nyasaland Protectorate.
Veterinary Department: report for 1932 450
Medical entomologist's report for 1931 449
Southern Rhodesia.
Report of Chief Veterinary Surgeon for 1932, 1933 555, 686
Straits Settlements.
Veterinary Department: report for 1932 789
Sudan.
Report of Veterinary Service for 1933 590
Report of Veterinary Research Officer for 1933 591
Sweden.
Civil Veterinary report for 1932 450
Tanganyika Territory.
Department of Veterinary Science and Animal Husbandry: report for 1932 295
Report of Veterinary Laboratory, Mpwapwa, 1932 .. 297
Uganda.
Veterinary Department: report for 1932 790
Report of Veterinary Pathologist, Entebbe, 1932 791
Human Trypanosomiasis Research Institute: report for 1933.. 792
Union of South Africa.
Department of Agriculture: report for year ended 30th June, 1933 589
Division of Veterinary Services and Animal Industry: report for year ended 30th June, 1933 589
Division of Economics and Markets: report for year ended 30th June, 1933 589
United States of America.
Cornell University: report of New York State Veterinary College, 1931-32 401
Report of Chief of Bureau of Animal Industry, 1933 .. 688
American Veterinary Medical Association.
Report of committee on poultry diseases .. 260, 436
Report of committee on transmissible diseases of swine 259
United States Livestock Sanitary Association.
Report of Proceedings of 37th annual meeting at Chicago, December 6-8, 1933 689
Report of committee on *Br. abortus* infection 646
Report of committee on miscellaneous transmissible diseases 665
Report of committee on transmissible swine diseases .. 765
Report of committee on tick eradication 659
REPRODUCTION. See also Breeding.
Vitamin A deficiency related to reproduction in range cattle 625
Physiology of reproduction in swine. Fertility of boars .. 780
RESEARCH.
Medical research in clinic and laboratory 294
Agricultural research in Australia 633
Veterinary research in East Africa 683, 685
RESEARCH INSTITUTES AND LABORATORIES. See also Reports, Serum Institutes.
Animal Health Research Station at Oonoomba, Townsville, Queensland, Australia 71
F. D. McMaster Animal Health Laboratory - Field Area at "Hinchinbrook" 634
Institute of Parasitology at Macdonald College, Quebec .. 788
Research Laboratory on Tuberculosis, Pasteur Institute, Paris 205
Pasteur Institute of Morocco, Casablanca 137
Imperial Institute of Veterinary Research, Muktesar .. 491

PAGE

RESISTANCE TO DISEASE. See Immunity.
"RESORCIN."
Chemotherapy of contagious abortion with "resorcin" .. 501
RESPIRATION, BACTERIAL. See Bacteria, general, metabolism.
RESPIRATORY SYSTEM.
Diseases. See also *Mycobacterium tuberculosis* infection in cattle, general.
Apparently new respiratory disease of chickens 262
Anaerobic, filter-passing organisms in normal and abnormal respiratory tract conditions 18
RETICULO-ENDOTHELIAL SYSTEM.
Reticulo-endothelial system in malaria 716
Reticulo-endothelial system in chemotherapy and immunity 45, 64
Reticulo-endothelial system and source of opsonin 64
Aseptic inflammation with localized blockade of reticulo-endothelial system 48
Selection with magnet and cultivation of reticulo-endothelial cells (Kupffer cells) 784
RHIPICEPHALUS.
Transmission of anaplasmosis by *R. sanguineus* .. 244, 245
Transmission of "louping ill" by *R. appendiculatus* .. 350
RHUBARB.
Poisoning by rhubarb 131
RICKETS.
Rickets 441
Phosphatase test for rickets 441
Antirachitic value of milk from cows fed irradiated yeast .. 55
RICKETTSIA.
Rickettsia in heartwater 74
R. psittaci in man and animals 357
Rickettsia-like organism in lymphocytes of sheep 518
RIECKENBERG REACTION. See Tests, Rieckenberg.
RIFT VALLEY FEVER.
Rift Valley fever 469
In Kenya 144
In French Sudan 731
Control in East Africa 685
Filtration of virus through graded collodion membranes .. 348
Cytological changes in liver in Rift Valley fever 469
RINDERPEST.
General.
In Turkey 259
In Burma in 1932 190
In Ceylon 191, 593
In India 400, 551, 615
In Africa 615
In Kenya 142, 143, 492, 635
In Nigeria 73, 74, 138, 140
In Sudan 590
In Tanganyika Territory 295
In Uganda 790, 791
Pathology of rinderpest 725
Rinderpest virus carriers 240, 615
Transmission of infection by contact 615
Contamination of rinderpest blood by piroplasms .. 73, 138
Variations of serum-proteins in rinderpest 512
Can dried hides spread rinderpest? 615
Control.
Control in field 428
Control in East Africa 684
Control in Gold Coast 792
Rinderpest eradicated from Federated Malay States .. 789
Control in Shanghai 346
Immunization.
Rinderpest immunization 345, 466
Fractional precipitation of antibody containing protein of anti-rinderpest serum 571
Action of serum and vaccine against rinderpest 428
Formolized vaccine 428, 466, 725
Anti-rinderpest vaccine 429
Trypan blue in sero-vaccination 346
Goat-virus against rinderpest 75, 297, 466
Goat-virus for immunization of calves 551, 615
Bull virus *cum* serum immunization of calves 429
Vaccination in Gold Coast 75, 76
Vaccination in Tanganyika Territory 297
Virus.
Electric charge of rinderpest virus 571
RINGWORM. See Favus, *Trichophyton*.
RODENTS. See Eimeria infection, general, Rats, Voles.
ROE DEER. See Deer.
ROTENONE.
Rotenone in warble fly control 542

PAGE

ROUNDWORMS. See Nematodes.
RUMANIA. See *Brucella abortus* infection in cattle, general, Marseilles endemic typhus, diagnosis, Typhus.
RUMEN.
Ciliates in rumen of cow 229
RUMINANTS, GENERAL. See also Camels, Cattle, Deer, Dromedaries, Sheep.
Infusoria of rumen and nutrition of ruminants 62
Calcium and phosphorus for domesticated ruminants .. 382
Anthelmintic treatment of small ruminants 674
RUMINATION.
Physiology of rumination 62, 133, 278, 390
Pharmacology of ruminant stomach 278
A non-ruminating goat 133
Alimentary tract of Merino sheep in South Africa 678
RUSSIA. See Union of Socialist Soviet Republics.

S

SALIVARY GLANDS.
Salivary glands in rabies 656
Secretion of phosphorus in saliva of sheep 545
Importance of assessing effects of salivary secretion in metabolism experiments 629
SALMONELLA. See *Bacterium*, Paratyphoid group.
SALT.
Saturated salt solution as warble larvicide 245
Brine for destruction of hookworm larvae 245
SANITARY INSPECTION. See Public Health.
SANTONIN.
Pharmacology of santonin 59
SAPONIN.
Effect of saponin on dissemination of sheep pox virus .. 104
Saponin as supplement to pig feeds 395
SARCOSPORIDIA.
Sarcosporidiasis in human cardiac muscle 164
SARNOWIEC'S METHOD. See Swine fever, diagnosis.
SAUTON'S MEDIA. See Media.
SAXONY. See Germany.
SCARLET FEVER. See Milk, diseases transmitted by, *Streptococcus*.
SCHERN-GORLI TEST. See Milk, heating.
SCHISTOSOMA INFESTATION.
Avian.
Bilharziella polonica in duck 59
Bovine.
Bovine nasal granuloma 38, 112, 249
Bovine nasal granuloma in India 249, 400
Sheep and cattle as reservoirs of human schistosomiasis .. 362
Equine.
Schistosomiasis in equines in India 551, 746
Ovine.
S. indicum in a sheep in India 400
SCHIZOTRYPANUM CRUZI. See *Trypanosoma cruzi*.
SCIENCE.
Science and agriculture in U.S.S.R. 398
SCLEROSTOMES. See Strongyles.
SCOLICES.
Rapid method of evaginating scolices in parasitic cysts .. 362
SCOTLAND. See Great Britain.
SCREW-WORM. See *Chrysomyia*.
SEA LIONS. See *Uncinaria*.
SEDIMENTATION RATE. See Blood, sedimentation rate.
SENECIO.
Seneciosis 273
Ragwort poisoning in cattle in Victoria 273
SEPTIC SORE THROAT. See Streptococcus infection, general.
SEROLOGICAL TESTS. See Tests, serological.
SERUM, BLOOD. See Blood.
SERUM, IMMUNE. See Antiserum.
SERUM INSTITUTES.
Imperial Veterinary Serum Institute, Muktesar 491
Mysore Serum Institute 494
Scientific work at Serum Laboratory, Copenhagen 1908-1933 555
SERUM SICKNESS. See Anaphylaxis.
SETARIA.
Chronic inflammation of sheath in mule due to *S. equina* .. 364
SEWAGE POISONING.
Sewage poisoning in cattle 272, 388
Effect on milk of drinking water contaminated with sewage .. 769
SEX HORMONES. See also Oestrum.
Sex hormones 282, 393, 679
New crystalline sexual hormone 67
Chemistry of sexual hormones 394

PAGE

SEX HORMONES [cont'd].
Excretion of sexual hormone in urine and blood of pregnant sows 679
SEXUAL CYCLE. See Oestrum.
SHEARING.
Blackleg in sheep due to shearing 17
SHEEP.
General. See also Breeding, Lambs, Licks, "Pernocton."
Handling and medication of sheep 47
Bacterial diseases. See *Bacterium abortus ovis* infection, *Bact. pyogenes*, Bleeding, Brucella infection in sheep, Circling disease of sheep, *Clostridium oedematiens*, *Cl. parabotulinum*, *Cl. tetani* infection, *Cl. welchii*, *Corynebacterium pseudotuberculosis ovis* infection, *Corynebact. pyogenes* infection, *Erysipelothrix rhusiopathiae* infection, Gasgangrene, *Haemophilus suipestifer*, *Mycobacterium paratuberculosis* infection, Pulpy kidney disease, *Spirillum*.
Diseases general. See also Abortion, general, Calculi, Catarrh, malignant oedema, "Coast disease," Deficiency diseases, Dermatitis, Enterotoxaemia, Foot-rot, Lightning stroke, Milk fever, Nairobi sheep disease, Ophthalmia, contagious, Pregnancy disease of ewes, Skin, diseases, "Tick-borne fever."
Pasture diseases of sheep 121
Earth-borne disease of sheep in Germany 46
Diseases of sheep in the Levant 175
Sheep diseases in New Zealand 47
Fungous diseases. See Favus, Dermatitis, mycotic.
Metazoan parasites. See Anthelmintics, Blowflies, *Bunostomum*, Carbon tetrachloride, Copper sulphate *Cysticercus*, *Fasciola*, *Haemonchus*, Helminth parasites general, sheep parasites, Hookworms, Keds, *Lucilia*, Nematodes, *Oesophagostomum*, Oestridae, *Oestrus ovis*, *Psoroptes*, Schistosoma infection, Stomach worms, Strongyles, *Syngamus*, *Trichostrongylus*, Zoppina vermilacia.
Physiology. See Alimentary tract, Blood, mineral content, Caecum, Genital system, Metabolism, Nutrition, Ovulation, Parturition, Pregnancy, Salivary secretions, Sulphur, Teeth, Thyroid gland, Urine, Uterus, Wool.
Poisoning. See *Baliega muiriadrita*, Fluorine, Poisoning, poisonous plants.
Protozoan diseases. See Anaplasma infection, ovine, Babesia infection, ovine, Spirochaeta infection.
Virus diseases. See Aziactia, Ecthyma, contagious, Encephalomyelitis, "Louping ill," Pertstomatitis, Pleuropneumonia of sheep, Sheep pox, Sore mouth, Stomatitis.
SHEEP DIPS. See Dips.
SHEEP MAGGOT FLY. See Blowflies.
SHEEP POX.
Sheep pox in Europe 374
Sheep pox in Turkey 259
Effects of saponin and testicular extract on dissemination of sheep pox virus 104
Vaccination and serotherapy 355
Control of immunity to sheep pox by intradermal reaction .. 165
Durand and Consell's reaction in sheep pox 104
Disinfection with nitric acid on sheep pox virus 584
SHEEP SCAB. See *Psoroptes*.
SHIGELLA. See *Bacterium*.
SHIVERING.
Shivering in horses 375
SHWARTZMAN'S PHENOMENON.
Relation to Arthus' phenomenon 116
Influence of testicular extract on 116
SILICA.
Influence of silica on tubercle bacillus 89
Effects of colloidal silica on experimental tuberculosis .. 497
Silica content in blood serum of cattle, sheep, goats and pigs 783
SILVER FOXES. See Foxes.
SIMULIUM.
Indian Simuliidae 361
S. venustum Say 715
SKIN.
General.
Role of skin in anthrax 309
Skin as portal of entry for *Brucella abortus* 329
Diseases. See also *Actinomyces*, Bursati, *Demodex*, Dermatitis, mycotic, Dermatitis, pustular, Impetigo, Mange, Neoplasms, *Psoroptes*, *Streptothrix*.
Skin disease of buffaloes 691
Skin diseases of swine 732
Skin diseases in sheep and goats 379

PAGE

Skin diseases of land-workers in Germany 658
Skin diseases of goats in Nigeria 141
Stephanofilaria stilesi causing skin disease of cattle in U.S.A. 755
Effect of *Dermanyssus gallinae* on skin of man 662
SKIN REACTIONS. See Tests.
SKUNKS. See Eimeria infection, general.
SLAUGHTER.
Slaughter of animals 83, 383
Electrical stunning for slaughter animals 125
SLAUGHTER-HOUSES. See Abattoirs
SMALLPOX. See Variola.
SNAILS.
Liver fluke snail, *Limnaea truncatula* 111
SNAKE BITE. See Venoms
SNAKES, GENERAL. See Eimeria infection, ophidian.
"SNOTSIEKTE."
"Snotsiekte" in Kenya 685
SODIUM ARSENITE.
Toxicity of grass sprayed with sodium arsenite 626
SODIUM BICARBONATE.
Bicarbonate infections for acetonaemia in cow 387
Changes in poultry due to ingestion of sodium bicarbonate .. 629
SODIUM DISULPHONATE.
Action of catechol sodium disulphonate on *Opisthorchis felineus* 386
SODIUM HYDROXIDE.
Germicidal efficiency of sodium hydroxide 676
SODIUM LACTATE.
Sodium lactate in production of green discolouration by streptococci 597
SODIUM MONOIODOACETATE.
Toxic effect of sodium monoiodoacetate on trypanosomes .. 775
SODIUM STOVARSOL. See "Stovarsol."
SORE HEAD. See Fowl pox.
SORE MOUTH.
In feeder lambs due to filtrable virus 733
Sore mouth in sheep transmissible to man 733
SORGHUM.
Development of hydrocyanic acid in *Sorghum vulgare* .. 539
Stock poisoning by sorghums 554
SOUTH AFRICA. See Union of South Africa.
SOUTH AMERICA. See Psittacosis.
SOUTHERN RHODESIA. See also Anaplasma infection, genera., Babesia infection, genera., *Chrysomyia*, Foot and mouth disease, general, *Glossina*, Heartwater, Helminth parasites general, Horse-sickness, Ophthalmia, contagious, *Psoroptes*, Reports, Sweating sickness, *Theileria parva* infection, Trypanosoma infection, general, general.
Diseases of livestock in Southern Rhodesia 555, 686
SOWS. See Swine.
SPAIN. See Brucella infection in man, distribution, Law, *Stephanurus*.
SPARROWS. See Fowl plague, Hookworms.
SPARROW HAWK. See Aujeszky's disease.
SPERMATOZOA.
Morphology of spermatozoa of bulls 295
Changes in spermatozoa of bulls with impaired or enhanced fertility 780
Vitality of spermatozoon and liberated ovum in domestic animals 132
Motility of spermatozoa in reproductive tract of ewe 631
SPERMOPHILES.
Effect of BCG on spermophiles 9
SPINAL CORD.
Diagnosis of spinal cord diseases 480
Spinal cord lesions and vitamin deficiency 587
SPIRILLUM.
Spirilla of "Sodoku" in the dog 343
Spirillae in gazelle in Eritrea 479
Spirilla as cause of contagious abortion in sheep 710
SPIROCHAETAL JAUNDICE. See Leptospira infection.
SPIROCHAETA.
Electrophoresis research on spirochaetes 30
Development cycle of spirochaetes 343
Cultivation of avian spirochaete 724
Bacillus growing in symbiosis with fowl spirochaetes 16
Viability of spirochaetes dried *in vacuo* 652
Pathogenicity of fowl spirochaetes in artificial culture media 724
Soluble specific substance in spirochaetes 723
Demonstration of arsenic and gold in spirochaetes 774
Comparison of *Treponema recurrentis* and *T. gallinarum* .. 724
SPIROCHAETA INFECTION.
Spirochaete infection in guinea pigs 226

PAGE

SPIROCHAETA INFECTION [cont'd].
Susceptibility of pig to African strains of *S. hispanicum* .. 31
S. hispanicum var marocanum infection in jackal 31
SPLEEN.
Disease of spleen of horse caused by *Habronema megastoma* .. 112
Lymphoid cells of spleen of rats infected with *Trypanosoma brucei* 612
SPONDYLITIS.
Spondylitis in brucella infection in swine 606
STAGS. See Deer.
STAINING.
Gram stain and differential staining 396
Standardization of biological stains 682
Microscopical stains old and new 682
Behaviour of bacteria toward dyes .. 199, 293, 396, 682
Staining of fungi 185
Staining of blood and blood parasites 292, 396, 682
Staining of viruses (elementary bodies) 682
STAPHYLOCOCCUS.
General.
Pleomorphic organism showing relationships between staphylococci and actinomycetes 220
Toxins.
Food poisoning due to staphylococci 385
Toxic effects of staphylococcal filtrates 409
Cardiac action of staphylococcal toxin 409
STAPHYLOCOCCUS INFECTION.
Staphylococcus infection of cows' udders 563
Staphylococcal arthritis in turkeys 308
Anti-staphylococcic vaccine in treatment of pustular dermatitis in sheep and goats 145
STATISTICS. See Census.
STEPHANOFILARIA.
Stephanofilariasis in cattle 663
S. stilesi causing skin disease of cattle in U.S.A. 755
STEPHANURUS.
S. dentatus 754
S. dentatus in Spain 750
STERILITY.
Bovine sterility 437, 438
Infectious sterility in larger domesticated animals 376
Bovine sterility in Kenya 635, 685
Sterility in domesticated animals in India 418
Bovine sterility in New Zealand 295, 449
Genetic factors producing sterility 376
Physiological and genetic aspects of sterility 530
Causes of sterility in Ardenne mares 438
Sterility on *Brucella abortus* infected farms 418
Phosphorus deficiency and sterility of cattle 382
Sterility in males due to lack of vitamins A or E 376
Sterility in relation to endocrine deficiency 376
Treatment.
Therapy of sterility in cows 119
Wheat germ oil against sterility 274, 675
Treatment with sprouting wheat 675
Hot water treatment 777
Treatment by injections of liquor folliculi 130
STERILIZATION.
Rapid sterilization of gelatine culture media 448
STOCK LICKS. See Licks.
STOMACH.
Lesions in stomach of dog simulating actinomycosis 20
STOMACH WORMS. See also *Trichostrongylus*.
Control of parasitic gastritis of ruminants in India 751
Anhydrous sulphuric acid in parasitic gastritis of sheep .. 275
Copper sulphate and nicotine against sheep stomach worm .. 676
Treatment of parasitic gastritis in sheep and goats 61
Enumeration of parasitic worms in sheep and cattle 742
Carbon disulphide against swine stomach worms 675
STOMATITIS, OVINE.
Receptivity of rabbit and man to ovine stomatitis 733
Immunity of rabbit to ovine stomatitis 733
Virus of stomatitis in brain of sheep 733
STOMATITIS, VESICULAR.
Comparison of viruses of vesicular stomatitis and equine encephalomyelitis 352, 616
Propagation of virus in chick embryo 726
Cultivation of virus 353
Research in U.S.A. 688
STOMOXYS.
Reaction to varying temperatures 522
STONE. See Calculi.
"STOVARSOL."
"Stovarsol" in treatment of contagious agalactia .. 58, 444

PAGE

STRAITS SETTLEMENTS. See also Rabies, general, Reports.
Diseases of livestock in Straits Settlements 789
STRANGLES. See *Streptococcus equi* infection.
STREPTOCOCCAL MASTITIS. See also *Streptococcus*, in milk.
General.
Identity of *Str. mastitidis* 405
Bovine streptococcal mastitis .. 85, 86, 303, 405, 406, 642, 688
In Germany 597
In Australia 399, 553
In New Zealand 449
Acid milk in bovine mastitis 85
Route of infection of mastitis streptococci 307
Brucella abortus infection as predisposing factor to mastitis 418
Haemolytic power of streptococci from bovine mastitis .. 145
Pyogenic streptococci causing bovine mastitis 407
Correlation between certain properties of milk and type of inflammation in acute mastitis 198
Control.
Mastitis control 197, 306
Control by carbohydrate-rich food 766
Control in Switzerland 406
Control in U.S.A. 689
Diagnosis.
Diagnosis, general 4, 5, 86, 693
Diagnosis by sero-agglutination 145
Selective medium for diagnosis 303
Bromthymol blue test for diagnosis 406
Milk testing for diagnosis of mastitis 306
Leucocyte content of milk as correlated with bacterial count and pH for detection of mastitis 305
Comparison of fore-, mid- and end-milk in diagnosis .. 3
Preservation of milk samples with brilliant green 538
Transmission.
Influence of galactogenous infection 3, 4
Machine-milking and mastitis 4, 146
Treatment.
Treatment of streptococcal mastitis 129, 307, 772
Chemotherapy of streptococcal mastitis .. 57, 129, 307, 585
Antivirus therapy 307
Vaccination.
Vaccines in infectious mastitis 453
Value of including *Brucella abortus* in vaccine 554
STREPTOCOCCUS. See also Bacteria general, toxins, Streptolysins.
Morphology of streptococci 198
Streptococci in white mice 146
Resistance of streptococci to pasteurization 770
Differentiation of non-haemolytic streptococci by agglutination 200
Differential staining of streptococci 199
Discolouration of heated blood by streptococci 302
Production of H_2O_2 by streptococci 597
Haemolytic.
Bacillary forms in haemolytic cultures 302
Haemolytic streptococci of animals and man 408
Anaerobic methods for identification of 597
Differentiation of human and animal strains of haemolytic streptococci 408
Serological differentiation of haemolytic streptococci .. 199
Differentiation by precipitin tests 694
Behaviour on sugars 694
Toxic properties of serum extracts of 597
In milk. See also Streptococcal mastitis.
Streptococci in milk 407
Factors modifying growth of lactic streptococci 302
Relationships of leucocytes and streptococci to fibrosis of the udder 305
STREPTOCOCCUS INFECTION, GENERAL.
Immunity.
Preparation of antistreptococcus serum 307
Relation of allergy to general resistance in 368
Species immunity to virulent streptococci 303
Hypersensitiveness and immunity in 368
Antigenic structure of strangles streptococcus and haemolytic streptococcus of scarlet fever 694
STREPTOCOCCUS INFECTION IN FOWLS.
Disease of chickens due to haemolytic streptococcus .. 302
STREPTOCOCCUS INFECTION IN HORSES.
Haemolytic streptococci as cause of equine abortion 174
Streptococci from cases of Hoppegarten cough 453
Haemolytic streptococci of horses and their relation to streptococci of man 408

PAGE

STREPTOCOCCUS INFECTION IN MAN.
Milk-borne scarlet fever in U.S.A. 270, 407
Septic sore throat of milk origin 53
Streptococci isolated from throats of humans during epidemics of common cold 407
STREPTOCOCCUS INFECTION IN SWINE.
Streptococcal infections in swine 301, 695
STR. EPIDEMICUS INFECTION.
Infection of cow's udder with 3
Carriers of *Str. epidemicus* 53
Types in stock cultures of *Str. epidemicus* 408
STR. EQUI INFECTION.
Strangles in India 400
Differentiation of *Str. equi* 201, 301
Blood picture in strangles 622
Antigenic structure of *Str. equi* 694
Infection of cow's udder with 3
Disinfection of railway wagons infected with 487
STR. MASTITIDIS. See Streptococcal mastitis.
STR. MITIOR INFECTION.
Infection of cow's udder with 3
STREPTOLYSINS.
Varying haemolytic and constant combining capacity of streptolysins 368
STREPTOTHRIX.
Streptotricosis in goats in Nigeria 74, 142
STREPTOVITELLA.
S. acadiae from black duck 361
STRINGHALT.
Cause of stringhalt in horses 375
STRONGYLES.
Treatment and control of equine sclerostomiasis .. 578, 674
Prophylaxis of strongylidosis in sheep and cattle 744
Differentiation of infective larvae of *Strongylus* species .. 245
"STRUCK" IN SHEEP. See Enterotoxaemia.
STUNNING. See Slaughter.
SUDAN. See also Foot and mouth disease, general, *Globidium*, Pleuro-pneumonia, contagious bovine, Rabies, general, Reports, Rinderpest, general, Trypanosoma infection, general.
Diseases of livestock in Sudan 590, 591, 592
SUDAN GRASS.
Stock poisoning by Sudan grass 554
SUGAR, BLOOD. See Blood, chemical composition [sugar].
SULPHUR.
Sulphur content of bushes and grasses 289
Administration of sulphur to sheep 545
SULPHURIC ACID.
Anhydrous sulphuric acid in parasitic gastritis of sheep .. 275
SUNSTROKE.
Rapid death of rodents, etc., exposed to sun 480
Sunstroke in pigeons 481
SUPRARENAL GLAND. See Adrenal gland.
SURGERY.
Operation course for veterinary surgeons and students .. 495
SURRA. See *Trypanosoma evansi* infection.
SWANS. See *Clostridium botulinum* intoxication, *Cl. oedematiens*.
SWEAT. See "Dry coat" in horses.
SWEATING SICKNESS.
In calves in Kenya 143
In Northern Zululand 262
In calves in Southern Rhodesia 555
SWEDEN. See also Anaemia, equine infectious, *Bacillus anthracis* infection, general, *Bacterium pullorum* infection, general, Blackleg, *Brucella abortus* infection in cattle, general, *Erysipelothrix rhusiopathiae* infection, Foot and mouth disease, general, *Mycobacterium tuberculosis* infection in cattle, udder, Phosphorus, Reports, Swine fever.
Diseases of livestock in Sweden 450, 451
"SWEET CLOVER DISEASE." See Clover.
SWINE.
General. See Breeding, "Pernocton."
Anatomy. See Lymphaticsystem, Pelvis.
Bacterial diseases. See also *Bacterium coli*, *Bact. pullorum* infection, general, *Bact. suipestifer*, Blackleg, Botriomycosis, Brucella infection in swine, *Corynebacterium pyogenes* infection, *Haemophilus influenzae*, Paratyphoid group infection, Pasteurella infection, general, *Past. suiseptica* infection, Streptococcus infection in swine.
Bacterial flora in oral cavity, tonsils and accompanying lymph glands of head of swine 217
Diseases general. See also Abortion, general, Anaemia, swine, Broncho-pneumonia, enzootic, Cryptorchidism, Haemangioma, Hermaphroditism, Liver, Neoplasms, general, Parasitic infestation, general, Skin, diseases, Sterility.
Swine diseases and control 765
Report of committee on diseases of swine (U.S.A.) 259, 765
Diseases of suckling pigs 623
Swine diseases in U.S.A. 666, 668
Swine diseases in Uganda 791
Fungous diseases. See *Actinomyces*, Fungi, general, Gastritis, mycotic, *Mucor*.
Metazoan parasites. See Anthelmintics, *Cysticercus*, *Diphyllobothrium*, Helminth parasites general, swine parasites, *Stephanurus*, Stomach worms, *Trichinella*.
Physiology. See Blood, chemical composition [minerals], Blood, picture, Blood, sedimentation rate, Blood, serum, Pregnancy.
Poisoning. See Beetroot poisoning, Fluorine.
Protozoan diseases. See *Balantidium*, Spirochaeta infection, *Trypanosoma simiae*.
Virus diseases. See Agalactia, Aujeszky's disease, East African swine fever, Encephalomyelitis, swine, Influenza, swine, Swine fever.
SWINE ERYSIPELAS. See *Erysipelothrix rhusiopathiae* infection.
SWINE FEVER. See also East African swine fever.
General.
Swine fever 231, 516, 727
Swine fever in wild pigs 48
Swine fever and enteritis in young pigs 515
Swine fever in Great Britain 189, 669
Swine fever in Germany 232
Swine fever in Sweden 451
Swine fever in Europe 375
Swine fever in U.S.A. 514, 652
Blood picture.
Blood picture in swine fever 428, 729
Carriers.
Swine fever virus carriers 240, 653
Control.
Control of swine fever 478
Control of swine fever in U.S.A. 689
Diagnosis.
Diagnosis of swine fever 515
Sarnowiec's method of 346, 728
Diagnostic value of lymph gland changes in swine fever .. 729
Disinfection.
Disinfection of swine fever virus with caustic soda .. 180
Histological changes.
Microscopic changes in digestive tract in 33
Local eosinophilia of intestinal wall in 346
Splenic lesions in 346
Immunization.
Immunization against swine fever 346, 428, 653
Method of foot and mouth disease vaccination applied to swine fever 516
Formol vaccine for swine fever in Czechoslovakia 653
Immunizing value of defibrinated blood and serum .. 104
Virus in bodies of swine after simultaneous inoculation .. 727
Difficulties of serum-virus method of immunization .. 727
Treatment.
Serotherapy for swine fever 514
Viability of virus.
Viability of swine fever virus in manure 515
Longevity of virus in glycerinated medium 515
SWINE INFLUENZA. See Influenza, swine.
SWINE PLAGUE. See *Pasteurella suiseptica* infection.
SWITZERLAND. See *Mycobacterium tuberculosis* infection in cattle, control, Streptococcal mastitis, control.
SYNGAMUS.
S. indicus from Indian elephant 41
S. nasicola from sheep and cattle in West Indies 751
S. trachea in the goose 748
Gapeworm in poultry and game birds 751
S. ierei sp. nov. from domestic cats 751
SYRINGES.
New Hauptner syringe with automatic dosage control .. 397
Tuberculin syringe with bayonet fitting 681

T

TABANIDS.
Transmission of anaplasmosis by horse flies 25
TAENIA.
Immunization of dogs against *T. echinococcus* 363
TANGANYIKA TERRITORY. See also Anaplasma infection, bovine, *Bacillus anthracis* infection, general, Blackleg,

PAGE

TANGANYIKA TERRITORY [cont'd].
Cysticercus, Foot and mouth disease, general, *Glossina*, *Mycobacterium tuberculosis* infection in cattle, general, Oestridae, Pleuro-pneumonia, contagious bovine, Pleuro-pneumonia, contagious caprine, Rabies, general, Reports, Rinderpest, general, *Theileria parva* infection, Trypanosoma infection general, transmission.
Animal nutrition research in Tanganyika 288
Diseases of livestock in Tanganyika 295, 296, 297
TANNERY EFFLUENTS. See *Bacillus anthracis* infection.
TAPEWORMS. See Cestodes.
TAPIR. See *Trypanosoma evansi* infection.
TAR.
Tar preparations in warble fly control 542
TECHNIQUE.
General. See also Anaesthesia, Apparatus, Cytology, Filtration, Media, Microscopy, Photography, *Post-mortem* technique, Staining, Sterilization, Tests.
Simple glass mortar for soft tissue 137
Special method for titration of consistency of agar and gelatine 448
Methods of determining degree of calcium deficiency of sheep 633
Use of capillary tubes for transport of specimens from cases of suspected venereal disease 683
Bacteriological. See Bacteria, general, technique.
Blood. See Blood, general, Blood, corpuscles, Blood, platelets, Blood, sedimentation rate, Blood, serum, Blood, transfusion, Guttadiaphot, Staining.
Entomological. See Fly traps, *Glossina*, *Ixodes*.
Helminthological. See Cestodes, general, *Cysticercus*, Helminth parasites general, general, Stomach worms.
Milk. See Milk, bacterial content.
Optical. See Ultropak.
Pathological. See also Endoscope, Poisoning, miscellaneous, Thyroid gland.
Aids to pathological technique 495
Physiological. See Breeding, Castration, Reticulo-endothelial system.
Protozoological. See Microdissection, Staining, Trypanosoma general, technique.
Virus. See Staining.
TEETH. See also Dental caries.
Changes in teeth of white rats due to chronic fluorosis .. 181
Effect of vitamin A on tooth formation 265
Aspects of dental attrition in New Zealand sheep 441
Periodontal disease in adult cart-horses 531
TEMPERATURE, ATMOSPHERIC.
Influence of temperature on activity of sheep blowflies .. 661
TERATOLOGY. See Cystic mole.
TESCHIN SICKNESS. See Encephalomyelitis, swine.
TESTICLE.
Effect of testicular extract on dissemination of sheep pox virus 104
Influence of testicular extract on Shwartzman's phenomenon 116
Formolized testicular tissue as vaccine against rinderpest .. 428
Regeneration of testis in place of removed ovary in guinea fowl 632
Changes in testes of bulls with impaired or enhanced fertility 780
TESTS.
Acid agglutination.
Electrophoresis research on spirochaetes. Acid agglutination 30
Agglutination. See Tests, acid agglutination, Tests, serological [agglutination].
Allergic. See Tests, skin, Tests, ophthalmic.
Ascoli test. See Tests, serological [Ascoli's].
Bromthymol blue test. See Tests, chemical [bromthymol blue].
Chemical. See Tests, serological [mercuric chloride].
Chemical [bromthymol blue]. See Streptococcal mastitis, diagnosis.
Complement-fixation. See Tests, serological [complement-fixation].
Flocculation. See Tests, serological [flocculation].
Intradermal tests. See Tests, skin [intradermal].
Mercuric chloride test. See Tests, serological [mercuric chloride].
Ophthalmic. See *Brucella abortus* infection in cattle, diagnosis [general], *Mycobacterium tuberculosis* infection in cattle, diagnosis.
Precipitin. See Tests, serological [precipitin].
Pregnancy diagnosis. See Pregnancy, diagnosis.
Rieckenberg. See Tests, serological [thrombocytobarin].

PAGE

Serological [general]. See also *Bacterium pullorum* infection, diagnosis, *Brucella abortus* infection in cattle, milk, *Mycobacterium tuberculosis* infection in cattle, udder, Trypanosoma infection general, diagnosis, *Tryp. equiperdum* infection, diagnosis.
Technique and indications for blood diagnositic tests in domestic animals 547
Mutations as governing bacterial characters and serologic reactions 738
Serological [agglutination]. See also *Bacterium pullorum* infection, diagnosis [agglutination test], Brucella infection general, diagnosis [agglutination test], Brucella infection general, udder infection, Brucella infection in man, diagnosis, *Br. abortus* infection in cattle, diagnosis [agglutination test], *Erysipelothrix rhusiopathiae* infection, Marseilles endemic typhus.
Optimal proportions in agglutination 373
Serological [Ascoli's]. See *Bacillus anthracis* infection, diagnosis.
Serological [complement-fixation]. See *Bacterium pullorum* infection, diagnosis, *Brucella abortus* infection in cattle, diagnosis [complement-fixation test], *Mycobacterium tuberculosis* infection in cattle, milk, Trypanosoma infection general, diagnosis, *Tryp. equiperdum* infection, diagnosis.
Serological [flocculation]. See Leishmania infection, general, *Mycobacterium tuberculosis* infection general, diagnosis, *Pfeifferella mallei* infection, diagnosis, Plasmodium infection, general, Trypanosoma infection general, diagnosis.
Serological [mercuric chloride]. See Trypanosoma infection general, diagnosis, *Tryp. evansi* infection, diagnosis.
Serological [milk]. See *Mycobacterium tuberculosis* infection in cattle, diagnosis [general].
Serological [precipitin]. See also *Bacterium pullorum* infection, diagnosis [general], *Mycobacterium tuberculosis* infection in birds, diagnosis, *Streptococcus*.
Technique of precipitation reaction 760
Serological [thrombocytobarin]. See *Trypanosoma equiperdum* infection, immunity.
Skin. See also Ascarids, Bacteria general, toxins, Brucella infection general, diagnosis, Brucella infection in horses, Brucella infection in sheep, *Br. abortus* infection in cattle, diagnosis [skin tests], *Mycobacterium tuberculosis* infection general, diagnosis, *Pasteurella pseudotuberculosis* infection, *Pfeifferella mallei* infection, diagnosis, *Trichinella*, diagnosis.
Skin [intradermal tuberculin]. See *Mycobacterium tuberculosis* infection in birds, *M. tuberculosis* infection in cattle, diagnosis [intradermal tuberculin test], *M. tuberculosis* infection in dogs, diagnosis, *M. tuberculosis* infection in swine, diagnosis.
Skin [tuberculin]. See *Mycobacterium tuberculosis* general [tuberculin], *M. tuberculosis* infection general, diagnosis, *M. tuberculosis* infection in cattle, diagnosis [tuberculin test], *M. tuberculosis* infection in horses, diagnosis.
Value of tuberculin tests in man 43
Thrombocytobarin. See Tests, serological [thrombocytobarin].
Tuberculin. See Tests, skin [tuberculin].
Tuberculin test [intradermal]. See Tests, skin [intradermal tuberculin].
Verne's test. See Tests, serological [flocculation].
TETANUS. See *Clostridium tetani* intoxication.
TETANY. See Grass tetany.
TETRACHLORETHYLENE.
Treatment of parasitic gastritis in sheep and goats with tetrachlorethylene 61
TEXT BOOKS.
General.
Practice of veterinary medicine 557
Practical animal husbandry 691
Economic mammalogy 80
First aid hints for horse owners 196
Keeping a dog. Training and care in health and sickness 144
Hutchinson's popular dog encyclopaedia 558
Bacteriology.
Manual of veterinary bacteriology 194
German translation of "Manual of pure culture study of bacteria" 495
Brucella infections in animals and man 494
Tuberculosis 452

PAGE

TEXT BOOKS [cont'd].
Biochemistry.
Practical physiological chemistry 196
Introduction to biochemistry 692
Biology.
Modern theories of development 81
Mechanism of creative evolution 402
Diseases general.
Standard classified nomenclature of disease 637
Prophylaxis of infectious and parasitic diseases of domestic animals of Brazil 404
Animal diseases in South Africa 79
Poultry diseases 84
Origin of cancer 596
Entomology.
Veterinary entomology 795
Arachnida. Systematic biology 80
Helminthology.
Veterinary helminthology 795
Immunity.
Outline of immunity 451
Influence of nervous system and various biological and psychological factors on immunity 558
Obstetrics.
Obstetrics in the horse 796
Obstetrics for cattle and horses 194
Physiology.
Physiology of domestic animals 557
Endocrine syndromes 403
New light on endocrinology 403
Poisoning.
Toxicology of plants in South Africa together with a consideration of poisonous foodstuffs and fungi 595
Protozoology.
Coccidia and coccidiosis of animals and man 638
Public health.
Veterinary hygiene 556
Sanitary inspector's handbook 82
Trichinosis inspection 403
Humane slaughter 83
Meat inspection 403, 595, 636
Surgery.
Operation course for veterinary surgeons and students .. 495
Technique.
Post-mortem examination of domestic animals 195
Aids to pathological technique 495
Cytological technique 452
Infra-red photography 496
Microscopy 83, 692
Therapeutics.
Introduction to pharmacology and therapeutics 82
Endocrine opotherapy 496
THEILERIA INFECTION, GENERAL.
Infection of zebu cattle by *Theileria* 22
Do relapses occur in theileriasis of North Africa? 565
Th. parva and *Th. annulata* infection in bovines in Italy .. 162
Th. recondita in France 162
Pre-immunization of calves against *Th. annulata* 609
Theileriasis after premunition 565
Th. dispar infection and "gonacrine" 609
Th. mutans in a bull 609
TH. ANNULATA. See Theileria infection, general.
TH. DISPAR. See Theileria infection, general.
TH. MUTANS. See Theileria infection, general.
TH. PARVA INFECTION [EAST COAST FEVER].
Th. parva infection in bovines in Italy 162
Control of East Coast fever in East Africa 685
East Coast fever in the Belgian Congo 22
East Coast fever in Kenya 142, 143, 493, 635
East Coast fever in Nyasaland 450
East Coast fever in Southern Rhodesia 555, 686
East Coast fever in Tanganyika Territory 296
East Coast fever in South Africa 589
TH. RECONDITA. See Theileria infection, general.
THELAZIA.
T. callipaeda infection in man and dog 252
THERAPEUTICS. See also "Acridine" derivatives, Anaesthesia, Anthelmintics, Antimony preparations, Antiserum, "Arecoline," Arsenic, "Ascaridol," "Atebrin," Calcium, Carbon tetrachloride, "Concipin," Dips, Disinfection, "Distol," "Dn 12," Dyes, Endocrine glands, therapy, "Entozon," Ergosterol, irradiated, Ergotamine, "Fouadin," Gold, "Gonacrine," Insecticides, Iodine, Limonite Liquor folliculi, Milk, therapy, Morphine, "Naganol," "Nemural," Non-specific stimulation therapy, "Neosalvarsan," "Novarsenobillon," Orthophenylphenol, "Oxychinol," Phenyl-mercuric compounds, "Piroblue," Pituitrin, "Plasmoquine," "Prolan," Pseudomorphine, Pyrethrum, Quinine, Resorcin, "Santonin," Silica, Sodium bicarbonate, Sodium disulphonate, Sodium monoiodoacetate, "Stovarsol," Sulphuric acid, Tetrachlorethylene, "Todorit," Tracheal brushes, "Triformol-glycerine-allylique," "Trypan blue," "Trypanarsyl," "Tryptophane," "Valvanol," Wheat, Wheat-germ oil, Yoghurt.
Introduction to pharmacology and therapeutics 82
Therapeutic problems of the future 56
Role of reticulo-endothelial system in chemotherapy 45, 64
Drugs excreted in milk 128
Effect of various therapeutic agents on *Brucella abortus* infection in guinea pigs 329
Streptococcal mastitis and chemotherapy 307, 772
Bacelli's treatment of tetanus 386
Effect of chemotherapeutic substances on trypanosomes .. 443
Treatment for internal and external parasites 675
THROAT. See Guttural pouch.
THROMBASE.
Preparation and properties of thrombase 283
THYMUS GLAND.
Lymphoid cells of thymus of normal rats and rats infected with *Trypanosoma brucei* 612
THYROID GLAND. See also Goitre.
Amount of iodine in thyroid glands of Australian Merino sheep 548
Iodine content of thyroid glands of dogs in Uruguay .. 132
Iodine compounds in treatment of thyroid disease 387
Electrical method of diagnosis of thyroid gland diseases .. 397
Measuring thyroid dysfunction 397
TICK-BORNE DISEASE.
Tick-borne disease, "Makebbe" in calf 790
"TICK-BORNE FEVER."
"Tick-borne fever" of sheep 106
TICK FEVER. See Babesia infection, general.
TICKS, GENERAL. See also *Argas, Boophilus, Dermacentor, Haemaphysalis, Hyalomma, Ixodes, Ornithodorus, Rhipicephalus.*
Experimental studies on ticks 358
Pathological condition observed in ticks 618
Technique for routine and experimental feeding of ixodid ticks on guinea pigs and rabbits 359
Tick infestation and control in Australia 553, 554
Ticks of East Indian Archipelago 108
Ticks of Belgian Congo 37
Ticks in Gold Coast Colony 76
Ticks in Kenya 143, 241, 493
Tick parasites in U.S.A. 618
Tick eradication in U.S.A. 618, 659
Tick transmission of "louping ill" 105
Pyrethrum for winter control of ticks 774
Repellant and killing effects of Gordura grass on seed tick .. 659
Tick and blowfly problems. Suggested use of cattle egret bird 521
TIMOTHY GRASS BACILLUS. See *Mycobacterium phlei.*
TISSUE CULTURES.
Dermal strain of vaccinia virus grown on chorio-allantoic membrane of chick embryos 239
Fowl plague virus in tissue cultures 735
TISSUE PERMEABILITY.
Group of chemicals active in increasing tissue permeability and enhancing certain infectious processes 398
"TODORIT."
Treatment of bovine piroplasmosis with "todorit" 444
TONSILS.
Tuberculosis of tonsils in cattle 310
TORTOISES. See Aujeszky's disease.
TOXICOLOGY. See Poisoning.
TOXINS, BACTERIAL. See Bacteria, general, toxins.
TOXOCARA.
Resistance of cat to *T. mystax* 750
Prenatal ascaridiasis, *T. canis* 435
TOXOPLASMA.
T. caviae in guinea pigs 229
T. cuniculi in rabbits 229
TRACHEAL BRUSHES.
Removal of lungworms from foxes with tracheal brushes .. 127
TRACHEAL CANULA.
Tracheal canula for collection of bronchial mucus 489
TRANSCAUCASIA. See Union of Socialist Soviet Republics.

PAGE

"TRANSIT FEVER."
"Transit fever" in cow 49
TRANSVAAL. See Union of South Africa.
TRAPS FOR INSECTS. See Fly traps.
TREATMENT. See Therapeutics.
TREMATODES. See also *Amphistoma, Fasciola, Nanophyetus, Notocotylus, Opisthorchis, Parametorchis, Prosthogonimus, Psilostomum, Schistosoma, Streptovitella, Zygocotyle.*
Observations on Australian human trematode endemiology based on local sheep fluke investigations 248
Fluke infestation of ruminants in India 751
TREMBLES.
Trembles 778
TRIATOMA.
Trypanosoma cruzi can develop in body cavity of *T. megista* 28
Transfer of *Tryp. cruzi* from *T. protracta* to mammals in California 103
TRIBULUS.
Presence of lethal factor in genus *Tribulus* 677
TRICHINA. See *Trichinella.*
TRICHINELLA.
Trichinella in Palestine 363
Trichinosis inspection 403
Effects of low temperatures on larvae of *T. spiralis* .. 42, 474
Infectivity of young trichinella larvae 474
Destruction of *Trichinella* in Bologna sausage.. 474
T. spiralis in pigs, dogs and rats in Java 691
Resistance to infestation with *T. spiralis* in hogs .. 42, 366
Eosinophilia in swine trichinosis 253
Susceptibility of rat and guinea pig to trichinella infection *per os* 474
Trichinosis in man, from bear meat 42
Preparation of trichinosis demonstration material 42
Intradermal tests in diagnosis of trichinosis .. 366, 749, 758
TRICHOMONAS INFECTION.
Cattle.
Trichomonas infection in cattle 228, 341, 717
Trichomonas of men, dogs, cats and cattle 227
Trichomonad abortion in cattle 427, 613
Cultivation of *T. bovis* 227, 613
Pigeons.
Trichomoniasis of pigeons 29, 613, 717
TRICHOPHYTON.
Trichophyton of horse and ox 711
TRICHOSTRONGYLUS.
The genus *Trichostrongylus* Looss, 1905 41
T. longispicularis sp. nov. from sheep 251
Trichostrongylus infestation in horse 251
Trichostrongylus of birds 753
Trichostrongylus in New York State 751
TRICHOSTRONGYLIDS. See also *Haemonchus, Ostertagia, Trichostrongylus.*
Trichostrongylid nematodes from sheep in Kenya 113
Ovine trichostrongylids reported from Australia 251
Trichostrongylosis in sheep 619, 620, 752
Classification of trichostrongylids 752
TRIFOLIUM HYBRIDUM. See Clover.
"TRIFORMOL-GLYCERINE-ALLYLIQUE."
"Triformol-glycerine-allylique" for parasitic bronchitis in cattle 773
TRINIDAD. See Rabies, Trinidad and South American virus.
TRINIDAD VIRUS. See Rabies.
"TRISTEZA."
Immunization against "tristeza" 24
TROPICAL MEDICINE.
British discoveries in tropical medicine during last hundred years 137
"TROSILIN."
Disinfection of foot and mouth disease virus with "trosilin" 541
"TRYPAN BLUE."
"Trypan blue" and *Brucella abortus* infection 128
"Trypan blue" in sero-vaccination against rinderpest .. 346
"TRYPANARSYL."
Transmissibility in man of trypanosomiasis resistant to "trypanarsyl" 341
TRYPANOSOMA, GENERAL.
General.
Rare trypanosomes from Belgian Congo 720
Polymorphic trypanosomes of Damba Island, Victoria Nyanza 509
Nigerian strains of polymorphic trypanosomes 463
Classification of trypanosomes of mammals 224
Cultivation.
Nutrition of Trypanosomidae 464
Cultivation of pathogenic trypanosomes 720
Function of blood in cultures of trypanosomids 164
Technique.
Demonstration of arsenic and gold in trypanosomes .. 774
Technique for isolating single trypanosomes 464
Transmission.
Trypanosomiasis and tsetse fly in Tanganyika 296
Factors influencing transmission of polymorphic trypanosomes by tsetse 163, 425, 509
Transmissibility of polymorphic trypanosomes of Damba Island, Victoria by *Glossina palpalis* 102
Factors influencing trypanosome infection rate in tsetse .. 243
Susceptibility of sexes of *Glossina* to trypanosome infection 659
Development of polymorphic trypanosomes in gut of *Glossina* 243
TRYPANOSOMA INFECTION, GENERAL.
General.
Animal trypanosomiasis in Nigeria 139
Animal trypanosomiasis in Southern Rhodesia 555
Animal trypanosomiasis in Sudan 591
Animal trypanosomes in Uganda 610
Research on animal trypanosomiasis in Uganda 713
Animal trypanosomiasis in French Equatorial Africa .. 463
Research on animal trypanosomiasis at Muktesar 552
Bovine trypanosomiasis of the Belgian Congo 610
Bovine trypanosomiasis in Nigeria 73
Bovine trypanosomiasis in Nyasaland 450
Research on bovine trypanosomiasis in Tanganyika .. 223
Bovine trypanosomiasis in Uganda 790
Distribution of human trypanosomiasis 27
Transmissibility in man of trypanosomiasis resistant to "trypanarsyl" 341
Disappearance of trypanosomes in three European carriers 27
Report of Human Trypanosomiasis Research Institute, Uganda for 1933 792
Trypanosomiasis in guinea pigs 226
Blood.
Blood-sugar and blood-urea in trypanosomiasis 464
Trypanosome infection and blood sulphocyanate content .. 721
Control.
Suggestions for control of human trypanosomiasis .. 27
Diagnosis.
Serum proteins and Henry's reaction in experimental trypanosomiasis 225
Diagnosis by deviation of complement 621
Immunity.
Immunity to trypanosomes 621
Action of sera on trypanosomes pathogenic for man .. 510
Transmission. See *Trypanosoma* general, transmission.
Treatment.
"Dn 12," organic antimony derivative in human trypanosomiasis 443
Effect of certain chemotherapeutic substances on trypanosomes 443
Resistance of trypanosomes of man to arsenic 443
Toxic effect of sodium monoiodoacetate on trypanosomes 775
Treatment of trypanosomiasis in dogs 487
T. ANNAMENSE INFECTION.
Experimental infection and drug treatment of cats 225
T. BRUCEI INFECTION.
Domestic fowl as host for *T. brucei* 163
Experimental infection of dog and drug treatment 26
Lymphoid cells of rats infected with *T. brucei* 612
Strain of *T. brucei* from Zuiuland 719
Experimental *T. brucei* infection and immunity in American deer mice 759
T. CAZALBOUI. See *T. vivax.*
T. CONGOLENSE INFECTION.
Experimental infection of mouse by *T. congolense* and treatment 612, 720
T. CRUZI.
Passage of *T. cruzi* through *Triatoma megista* .. 28, 103
Transmission of *T. cruzi* from insect to vertebrate 28
T. DUTTONI.
T. duttoni in splenectomized animals 225
Multiplication forms of *T. duttoni* in fatal infections in mice 720
T. EQUIPERDUM INFECTION [DOURINE].
General.
Dourine 568
Dourine in Europe 375
Dourine in South Africa 589
Control.
Control of dourine 688, 720

PAGE

T. EQUIPERDUM INFECTION [DOURINE] [cont'd].
Diagnosis.
"Bennett and Kenny" reaction in guinea pigs infected with *T. equiperdum* 340
Complement-fixation test for *T. equiperdum* infection 224, 568, 621
Immunity.
Acquired immunity in *T. equiperdum* infected rats .. 621
Defence mechanism in *T. equiperdum* infections in guinea pigs and rats 719
Treatment.
"Naganol" in prophylactic treatment of dourine 486
T. EVANSI INFECTION [SURRA].
General.
Surra in Burma in 1932 190
Surra in Ceylon 594
Surra in horses and cattle in Mauritius 687
Surra in wild deer of Mauritius 341
Surra in India 551, 718
Surra in camels 611
Surra in a tapir 163
Blood chemistry in equine surra 718
Is there a developmental stage of *T. evansi* in *Glossina morsitans*? 718
Diagnosis.
Mercuric chloride test in diagnosis of surra 225
Bennett's test for surra in camels combined with use of "naganol" 759
Treatment.
"Naganol" effective against surra in India 401
Curative treatment of surra in horses with "naganol" .. 486
T. GAMBIENSE.
Behaviour of *T. gambiense* in culture 26
Cyclical transmission of *T. gambiense* by *Glossina palpalis* .. 340
T. rhodesiense versus T. gambiense: comparison of power to develop cyclically in *Glossina* 509
T. HIPPICUM.
Equine trypanosomiasis – "murrina" or "derrengadera" in Panama 568, 759
Susceptibility of bats to infection with horse trypanosome, *T. hippicum* Darling, in Panama 27
T. LEWISI.
Differences between *T. lewisi* from blood and from invertebrate host 103
Infection of rats with *T. lewisi* 103, 226
Influence of splenectomy on development of *T. lewisi* .. 612
Defence mechanism in *T. lewisi* infections in guinea pigs and rats 719
T. RABINOWITCHI.
Cultures of trypanosome of hamster, *T. rabinowitchi* .. 26
Multiplication and division of *T. rabinowitchi* 341
Capsules of *T. rabinowitchi* 341
Development cycle of *T. rabinowitchi* in rat 341
T. RHODESIENSE.
Infection of cerebrospinal fluid of antelope with *T. rhodesiense* 610, 720
Behaviour of *T. rhodesiense* from man, in antelope and other African game animals 510
Action of human serum *in vitro* on *T. rhodesiense* .. 510, 721
Production from polymorphic strain of *T. rhodesiense* of strain without posterior nucleus 509
T. rhodesiense versus T. gambiense: comparison of power to develop cyclically in *Glossina* 509
Experimental infection of man with *T. rhodesiense* 510
T. SIMIAE.
T. simiae of swine 611
T. SOMALENSE.
Cultivation of *T. somalense* of *Bufo regularis* 26
T. SOUDANENSE INFECTION.
Control of camel trypanosomiasis 223, 569
Diagnosis by mercuric chloride test 591
Treatment with "naganol" 591
T. THEILERI.
T. theileri 340
T. theileri in Dutch East Indies 510
T. VIVAX.
Hereditary transmission of *T. vivax* in cattle in Ruanda-Urundi 26
T. vivax infection in horses in Gold Coast 75
TRYPTOPHANE.
Tryptophane and growth of bacteria 335
TSETSE FLIES. See *Glossina*.
TUBERCULIN. See *Mycobacterium tuberculosis*, tuberculin, *M. tuberculosis* infection in cattle, tuberculin test, Tests, skin [tuberculin].

PAGE

TUBERCULOSIS. See *Mycobacterium tuberculosis* infection.
TULARAEMIA. See *Pasteurella tularensis* infection.
TUMOURS, MALIGNANT. See Neoplasms.
TUNIS, See Brucella infection in man, distribution, *Cysticercus*.
TURKEY. See also Babesia infection, general, *Bacterium sanguinarium* infection, Blackleg, *Brucella abortus* infection in cattle, general, Foot and mouth disease, general, Fowl pox, Goat pox, *Mycobacterium tuberculosis* infection in cattle, general, *Pasteurella aviseptica* infection, *Past. boviseptica* infection, *Pfeifferella mallei*, Pleuropneumonia, contagious caprine, Rabies, general, Rinderpest, Sheep pox.
Contagious animal diseases in Turkey and their control .. 258
TURKEYS. See Arthritis, *Bacterium sanguinarium* infection, *Capillaria*, *Histomonas meleagridis* infection (blackhead), Paratyphoid group infection.
"TURNING SICKNESS."
"Turning sickness" of animals in Uganda 791
TURPENTINE.
Turpentine in warble fly control 542
TYPHOID, FOWL. See *Bacterium sanguinarium* infection.
TYPHOID PIGEON. See *Bacterium aertrycke* infection.
TYPHUS.
Experimental research on typhus exanthematicus in dogs .. 355
Vector of tropical typhus in Kenya 355
Endemic typhus in Tripoli 431
Endemic typhus fever in Rumania 431
Typhus and Marseilles endemic typhus 431
Study of some eruptive fever viruses in the dog 470
Experimental transmission of virus of eruptive fever and typhus by blood-sucking insects 470
TYPHUS, ENDEMIC MARSEILLES. See Marseilles endemic typhus.
TYROL. See Austria.

U

UDDER DISEASES. See also *Actinomyces*, *Brucella abortus* infection in cattle, udder infection, Mastitis, Milk, *Mycobacterium tuberculosis* infection in cattle, udder, Streptococcal mastitis, *Streptococcus* in milk.
Extension of common udder infections in cows 602
Bacteria of healthy and diseased udder of cow .. 217, 304
Relationships of leucocytes and streptococci to fibrosis of udder 305
Anti-staphylococcic vaccine in treatment of pustular dermatitis of mammary gland of sheep and goats 145
UGANDA. See also Eimeria infection, avian, Eimeria infection, ophidian, *Glossina*, *Mycobacterium tuberculosis* infection in cattle, general, Nairobi sheep disease, Parasitic infestation, general, Poisoning, poisonous plants, Reports, Rinderpest, general, Tick-borne disease, *Trypanosoma*, general, Trypanosoma infection, general, "Turning sickness."
Diseases of livestock in Uganda 790, 791, 792
Diseases of swine in Uganda 791
ULTRAFILTRATION. See Filtration.
ULTRAVIOLET RAYS.
Utilization of ultraviolet rays in man and animals 134
"ULTROPAK."
Plate cultures in dark field with incident light (Ultropak) .. 184
UNCINARIA.
New species of *Uncinaria* from sea-lion 753
UNDULANT FEVER. See Brucella infection in man.
UNION OF SOCIALIST SOVIET REPUBLICS. See also Anaplasma infection, bovine, Babesia infection, ovine, Eimeria infection, general, Eimeria infection, avian, Medicine, general.
Science and agriculture in U.S.S.R. 398
UNION OF SOUTH AFRICA. See also *Aegyptianella pullorum*, Alimentary tract, Bacteria general, general, *Bdellolarynx uniseriatus*, Deficiency diseases, Foot and mouth disease, Helminth parasites, general, Horse-sickness, Law, Photosensitization, Poisoning, poisonous plants, Protozoa, general, Rabies, general, Reports, Sweating sickness, *Theileria parva* infection, *Trypanosoma equiperdum* infection, general, Viruses, general.
Animal diseases in South Africa 79, 589, 590
Mineral content and feeding value of natural pastures in South Africa 289
Domesticated animals of pre-European South Africa 294
UNITED STATES OF AMERICA. See also Actinobacillus infection, Anaplasma infection, bovine, Babesia infection, bovine, *Bacterium pullorum* infection, control, *Boophilus*,

PAGE

UNITED STATES ON AMERICA [cont'd].
Brucella infection, general, Brucella infection in man, *Br. abortus* infection in cattle, *Chrysomyia*, Councils, *Dermacentor*, Encephalomyelitis, equine, *Erysipelothrix rhusiopathiae* infection, *Fasciola*, Foot and mouth disease, general, Granuloma, nasal, Helminth parasites, general, Mange, Mastitis, Milk, bacterial content, Milk, diseases transmitted by, Milk, hygiene, *Mycobacterium paratuberculosis* infection [Johne's disease], *M. tuberculosis* infection general, control, *M. tuberculosis* infection in cattle, general, *M. tuberculosis* infection in cattle, control, Parasitic infestation, general, Poultry, general, Psittacosis, *Psoroptes*, Reports, *Stephanofilaria*, Stomatitis, vesicular, *Streptococcus*, Swine, general, Swine fever, control, Ticks, general, *Trichostrongylus*, *Trypanosoma cruzi*, *T. equiperdum* infection, control, Veterinary medicine, general.
Diseases of livestock in U.S.A. 688, 689
URINARY ORGANS. See also Haemoglobinuria.
Parasites of urinary organs of silver foxes 743
URINE.
Ketones of blood and urine of cow and ewe 284
Chemical composition of urine of cows 544
Threshold for renal excretion of inorganic phosphates in sheep 545
Effect of pregnancy and parturition on urinary constituents in ewe 586
Urine of normal dairy cows 628
Excretion of sexual hormone in urine of pregnant sows .. 679
URUGUAY. See Neoplasms, general, Thyroid gland.
UTERUS. See also Endometritis.
Primary uterine tuberculosis in cow 91
Bacteria-free culture of trichomonads from uterus of cattle on simple media 227
Pregnancy changes in uterus of cow 392
New uterus pump 549
Physiology and pathology of broad uterine ligament of cows.. 623
Pigmentation of uterine mucosa in ewe 630

V

VACCINES. See also *Bacillus anthracis* infection, immunization, *Bacterium abortus equi*, *Brucella abortus* infection in cattle, immunization [general], Distemper, dog, vaccination, Foot and mouth disease, immunization, Fowl plague, vaccination, Fowl pox, control, Fowl pox, immunization, *Mycobacterium tuberculosis* infection general, immunization, Paratyphoid group infection, Pasteurella infection, Pigeon pox, Pleuro-pneumonia contagious bovine, immunization, Rabies, immunization, Rinderpest, immunization, Sheep pox, Streptococcal mastitis, vaccination, Swine fever, immunization.
Glucoside vaccines 200, 256
Development of state control of veterinary sera and vaccines in Germany 293
New method of vaccination by "anabacteria" 373
Experimental research on "associated vaccinations" .. 442
Effect of repeated injections of bacterial vaccine .. 529, 663
VACCINIA.
Durand and Conseil's reaction in vaccinia 104
Cowpox in Pomeranian land-workers 658
Cowpox infection in man 731
Dermal strain of vaccinia virus grown on chorio-allantoic membrane of chick embryos 239
Vaccinia virus in meat, organs and blood of cattle used for production of smallpox lymph 355
Properties of vaccinia virus precipitated with aluminium or ferric salts 520
Mutual immunity between cowpox and foot and mouth disease 572
Lethal effect of light and dyes on vaccinia virus 658
Staining of vaccinia virus (elementary bodies), new method 682
VAGINA.
Vaginitis of cows caused by *Corynebacterium pyogenes* .. 457
Vaginal treatment of contagious abortion with "concipin" .. 321
"VALVANOL." See also *Trichomonas*.
"Valvanol" and antisepsis 276
VARICELLA.
New method of staining varicella virus (elementary bodies).. 682
VARIOLA.
New method of staining variola virus (elementary bodies) .. 682
VECTORS OF DISEASE. See under name of disease.
VENEZUELA. See Anaplasma infection, bovine.
VENOMS.
Preparation, standardization and use of concentrated African antivenom serum 273

PAGE

VESICULAR STOMATITIS. See Stomatitis, vesicular.
VETCH.
Poisoning of horses by *Vicia sativa*, *V. villosa*, *V. cracca* .. 779
VETERINARY MEDICINE, GENERAL.
Veterinary hygiene 556
Practice of veterinary medicine 557
Use of tetanus anatoxin in veterinary medicine 762
Historical retrospect on veterinary science in Germany .. 787
History of veterinary medicine in U.S.A. 788
VETERINARY SERVICES. See also Reports.
France. Conference of veterinary services on brucella infection 649
VIBRION SEPTIQUE. See *Clostridium septique*.
VICIA. See Vetch.
VICTORIA NYANZA. See *Trypanosoma*, general.
VIRUSES, GENERAL. See also Agalactia, Anaemia, equine infectious, Aujeszky's disease, Bacteriophage, Bluetongue, Dermattiis, pustular, Distemper, dog, Ecthyma, contagious, Ectromelia, infectious, Encephalomyelitis, equine, Encephalomyelitis, swine, Endothelioma, Foot and mouth disease, Fowl plague, Fowl pox, Goat pox, Heartwater, Horse-sickness, Inclusion bodies, Influenza, equine, Influenza, human, Influenza, swine, Laryngotracheitis, infectious, Leucaemia, Leucosis, fowl, "Louping-ill," Lymphogranuloma inguinale, Newcastle disease, Peristomatitis, Pleuro-pneumonia, bovine contagious, Pleuro-pneumonia, contagious caprine, Pleuro-pneumonia, ovine, Pneumonia, Poliomyelitis, Psittacosis, Rabies, *Rickettsia*, Rift Valley fever, Sheep pox, Sore mouth, Stomatitis, vesicula Swine fever, Typhus, Vaccinia, Varicella, Variola, Yellow fever.
General.
Virus diseases of animals in South Africa 79
Attenuation of viruses 520
Cultivation.
In vitro cultivation of filtrable viruses 737
Technique.
Demonstration of virus elementary bodies 738
VITAMINS
General.
Vitamin necessary for growth of *Clostridium sporogenes*: its relation to auxin and other growth factors 17
Spinal cord lesions and vitamin-deficiency 587
Potency of vitamin preparations 587
Vitamin A.
Vitamin A in helminthiasis 129
Effect of vitamin A on tooth formation 265
Characteristics of highly active vitamin A 290
Parental transmission of vitamin A 290
Vitamin A in food for herbivora 626
Sterility in males due to vitamin A deficiency 376
Vitamin A deficiency in cattle 381
Vitamin A deficiency related to reproduction in cattle .. 625
Vitamin A deficiency in dogs 178
Vitamin B.
Ability of vitamin B deficient rat to discriminate between diets containing and lacking the vitamin 289
Vitamin C.
Estimation and distribution of ascorbic acid (vitamin C) in animal tissues 293
Reducing substance (vitamin C) in tissues of fluorine-fed cows 587
Vitamin E.
Chemical and physiological properties of vitamin E .. 587
Sterility in males due to vitamin E deficiency 376
Treatment of sterility in cows with wheat-germ oil (vitamin E) 274
VOLES. See "Louping ill".
VOMITING.
Vomiting in dog as symptom of different diseases 121
VULVA.
Vulvar tuberculosis in cow 91

W

WARBLE FLIES. See Oestridae.
WATER IN TISSUES.
Absorption and excretion of water by mammal 63
WEIL-FELIX REACTION. See Marseilles endemic typhus.
WEIL'S DISEASE. See Leptospira infection.
WEST INDIES. See *Syngamus*.
WHEAT.
Treatment of sterility with sprouting wheat 274, 675
WHEAT-GERM OIL. See Vitamin E.

PAGE

"WHITE-MUSCLE DISEASE."
"White-muscle disease" in lambs 121
WINTER SCOURS. See Diarrhoea.
WITCH'S MILK.
Composition of "witch's milk" [milk of foals] 784
WOLVES. See *Grahamella*.
WOOL.
Influence of phosphorus and other minerals on wool growth 69
Pre-natal check in birthcoat of New Zealand Romney lamb.. 491
Growth of wool in the Merino 183
Wool from Merino stud rams 676
Influence of regular dipping on fleece of Merino 676
WORMS. See Helminth parasites.

Y

YEAST.
Yeast as cause of mastitis in cows 711
YELLOW FEVER.
Transfer of virus from female to male *Aëdes aegypti* .. 108
Infectivity of neurotropic yellow fever virus for animals .. 737
YEW POISONING.
Yew poisoning in domestic animals 539

PAGE

YOGHURT.
Yoghurt as remedy against avian coccidiosis 690

Z

ZEBU CATTLE. See Cattle.
ZOOLOGICAL GARDENS.
Anthrax in animals in zoological gardens 639
ZOOLOGY.
Index-catalogue of medical and veterinary zoology 167
ZOOTECHNY. See also Breeding, Nutrition.
Practical animal husbandry 691
Animal husbandry in Ceylon 594
Training and care of dog in health and sickness 144
Plantation horse management 294
Handling and medication of sheep 47
ZOPPINA VOMITORIA.
Zoppina vomitoria: new contagious disease of sheep and goats 110
ZULULAND. See Protozoa, general, *Trypanosoma brucei*.
ZYGOCOTYLE.
Lymph system of *Z. lunatum* 248

5
3

A